Installing and Administering the CIFS/9000 Server

HP Documentation Web Site: www.docs.hp.com

Manufacturing Part Number: B8725-90021
E0302

U.S.A.

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1 Introduction to the CIFS/9000 Server

This chapter provides a general introduction to this document, CIFS/9000, information about Samba, the Open Source Software suite

upon which the CIFS/9000 server is based, HP enhancements to the Samba source, along with the various documentation resources available for CIFS/9000.

Preface

The information in this manual is intended for network managers or network security administrators who install and administer the CIFS/9000 server.

This manual describes how to install, configure, and troubleshoot the HP CIFS/9000 software product on HP 9000 systems.

The manual is organized as follows:

Chapter 1	“Introduction to the CIFS/9000 Server” describes the Open Source Software (OSS) Samba Suite, upon which CIFS/9000 is based, and HP’s CIFS Enhancements to the Samba Server Source.
Chapter 2	“Installing and Configuring the CIFS/9000 Server” describes how to install, configure and verify the CIFS/9000 server software.
Chapter 3	“Managing HP-UX File Access Permissions from Windows NT/2000” describes how to use Windows NT and 2000 Clients to view and change standard Unix file permissions and VxFS POSIX Access Control Lists (ACLs).
Chapter 4	“Primary Domain Controller (PDC) Support” describes how to set up and configure a CIFS/9000 Server as the Primary Domain Controller (PDC).
Chapter 5	“Domain Member Server Support” describes the process for joining a CIFS/9000 Server to a Windows NT domain.
Chapter 6	“Configuring HA CIFS/9000” describes Active-Standby and Active-Active HA CIFS/9000 configurations.
Chapter 7	“HP-UX Configuration for CIFS/9000” includes information about the CIFS/9000 process model, kernel configuration parameters, and kernel parameter configuration for CIFS/9000.
Chapter 8	“GNU GPL License” contains a copy of the GPL license.

Introduction to CIFS/9000

CIFS/9000 provides HP-UX with a distributed file system based on the Microsoft Common Internet File System (CIFS) protocols. CIFS/9000 implements both the server and client components of the CIFS protocol on HP-UX.

The current CIFS/9000 Server (version A.01.08) is based on the well-established open-source software Samba, version 2.2.3a, and provides file and print services to CIFS clients including Windows NT, XP, 2000 and HP-UX machines running CIFS/9000 Client software.

The CIFS/9000 Client enables HP-UX users to mount as UNIX file systems shares from CIFS file servers including Windows servers and HP-UX machines running CIFS/9000 Server. The CIFS/9000 client also offers an optional Pluggable Authentication Module (PAM) that implements the Windows NTLM authentication protocols. When installed and configured within HP-UX's PAM facility, PAM NTLM allows HP-UX users to be authenticated against a Windows authentication server.

What is the CIFS Protocol?

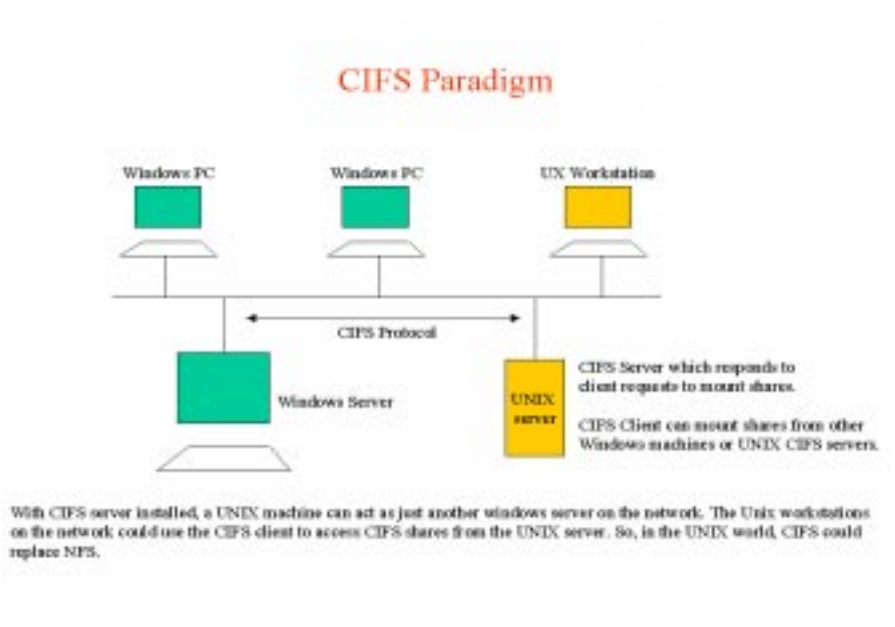
CIFS, or the Common Internet File System, is the Windows specification for remote file access.

CIFS had its beginnings in the networking protocols, sometimes called Server Message Block (SMB) protocols, that were developed in the late 1980's for PCs to share files over the then nascent Local Area Network technologies (e.g., Ethernet). SMB is the native file-sharing protocol in the Microsoft Windows 95, Windows NT, XP and OS/2 operating systems and the standard way that millions of PC users share files across corporate intranets.

CIFS is simply a renaming of SMB; and CIFS and SMB are, for all practical purposes, one and the same. (Microsoft now emphasizes the use of “CIFS,” although references to “SMB” still occur.) CIFS is also widely available on UNIX, VMS(tm), Macintosh, and other platforms.

Despite its name, CIFS is not actually a file system unto itself. More accurately, CIFS is a remote file access protocol; it provides access to files on remote systems. It sits on top of and works with the file systems of its host systems. CIFS defines both a server and a client: the CIFS client is used to access files on a CIFS server.

CIFS/9000 speaks the CIFS protocol from the HP-UX machines, which enables directories from HP-UX servers to be mounted on to Windows machines and vice versa.


CIFS Paradigm
Windows PC
Windows PC
UX Workstation
CIFS Protocol
Windows Server
UNIX server
CIFS Server which responds to client requests to mount shares.
CIFS Client can mount shares from other Windows machines or UNIX CIFS servers.

With CIFS server installed, a UNIX machine can act as just another windows server on the network. The Unix workstations on the network could use the CIFS client to access CIFS shares from the UNIX server. So, in the UNIX world, CIFS could replace NFS.

The Open Source Software (OSS) Samba Suite

The CIFS/9000 server source is based on Samba, an Open Source Software (OSS) project developed in 1991 by Andrew Tridgell in Australia. This section includes a very brief introduction to the Samba product. As there are many publications about Samba available online and in most bookstores, HP recommends that you use these source materials, some of which were written by Samba team members, for more detailed information about this product.

Open Source Software

Samba has been made available to HP and other users under the terms of the GNU Public License (GPL). This means that Samba is “free software”; free, that is, of any copyright restrictions. The goal of this type of software is to encourage the cooperative development of new software.

To learn about the GNU Public License, go to the following web site: http://www.fsf.org.

Samba Server Description and Features

With the Samba suite of programs, systems running UNIX and UNIX-like OSs are able to provide services using the Microsoft networking protocol. This capability makes it possible for DOS and Windows machines using native networking clients supplied by Microsoft to access a UNIX file system and/or printers.

As a user, you will see the UNIX file system as a drive-letter or an icon in the “Network Neighborhood” and you will be able to open files from inside your Windows program as if they are stored on your local system.

To accomplish this, Samba implements the Server Message Block (SMB) networking protocol on top of NetBios over TCP/IP.

For a complete discussion of Samba and its protocols, refer to chapters 1 and 2, in *Using Samba* by Robert Eckstein, David Collier-Brown and Peter Kelly

To access the Samba web site, go to http://www.samba.org.

Samba Documentation: Printed and Online

When using the CIFS/9000 product, HP recommends that you refer to Using Samba, by Robert Eckstein, David Collier-Brown and Peter Kelly along with the supplemental HP CIFS/9000 product documentation available in the */opt/samba/docs* directory shipped with the product. *Using Samba* is shipped with the CIFS/9000 Server and can be found in */opt/samba/swat/using_samba*. Starting with this release, it will be available through SWAT.

IMPORTANT

The book *Using Samba* describes a previous version of Samba (V.2.0.4). However, much of the information in *Using Samba* is applicable to this version of the CIFS Server. Readers should always use the HP-provided Samba man pages or the SWAT help facility for the most definitive information on the HP CIFS/9000 server.

Installing and Administering the CIFS/9000 Server will also be available on the *http://www.docs.hp.com/hpux/communications* web site.

A list of current non-HP Samba documentation is shown below.

- *Using Samba*, Robert Eckstein, David Collier-Brown and Peter Kelly. (O'Reilly, 2000), ISBN: 1-56592-449-5.
- Samba, Integrating UNIX and Windows by John D Blair (Specialized Systems Consultants, Inc., 1998), ISBN: 1-57831-006-7.
- Samba in 24 Hours by Carter, Gerald and Richard Sharpe. (SAMS, 1999), ISBN: 0-672-31609-9.
- Samba Administrator's Handbook by Ed Brooksbank, George Haberberger, and Lisa Doyle. (M&T Books, 2000), ISBN: 0-7645-4636-8.
- Samba Black Book by Dominic Baines. (Coriolis, 2000), ISBN: 1-57610-455-9.
- Samba Web site: http://www.samba.org/samba/docs.

NOTE Please note that non-HP Samba documentation sometimes includes descriptions of features and functionality planned for future releases of Samba. The authors of these books do not always provide information indicating which features are in existing releases and which features will be available in future Samba releases.

HP CIFS/9000 Enhancements to the Samba Server Source

The HP CIFS/9000 server product consists of Samba source code which has been enhanced with a variety of functional enhancements. The sections that follow will provide an overview of each of these enhancements. In some cases, *separate* sections of information will be provided. One section will be for version A.01.07 of the server and another for version A.01.08. Be sure that you are reading the information appropriate for your version. The sections are:

- Access Control List (ACL) Mapping Features for version A.01.07
- Access Control List (ACL) Mapping Features for version A.01.08
- NT Printing Support (new for version A.01.08)
- Distributed File System (DFS) Server Functionality (new for version A.01.08)
- Primary Domain Controller (PDC) Functionality (new for version A.01.08).

Access Control List (ACL) Mapping Features (version A.01.07)

The HP CIFS/9000 server product consists of Samba source code which has been enhanced with ACL (Access Control List) mapping features. These mapping features allow you to change ACLs from an NT client. These features include:

- Improved access to UNIX permission data through the NT ACL graphical interface on NT clients.
- Access to VxFS POSIX ACLs through the NT ACL graphical interface on NT clients.

Samba supports the viewing and changing of UNIX file permissions and VxFS POSIX ACLs from Windows NT clients.

You can view and change UNIX file permissions through the standard Windows Explorer interface when accessing NT ACLs.

Refer to Chapter 2 in this document for detailed information about configuring ACL support.

Refer to Chapter 3 in this document for more detailed descriptions of UNIX file permissions and of VxFS POSIX ACLs.

In addition, CIFS/9000 works with CIFS UNIX extensions. For more information about CIFS UNIX extensions, refer to the *Installing and Administering CIFS/9000 Client* manual.

Access Control List (ACL) Mapping Features (version A.01.08)

HP enhancements to the CIFS/9000 Server for version A.01.08 include all those for the previous version (A.01.07 - see the previous section), plus the following:

- This version provides a share level variable called “nt acl support” which allows users to turn ACL support on or off, on a per-share basis. Previous versions (A.01.07 and earlier) used a parameter called “acl schemes” to configure ACL support. This is no longer used.
- Support for NT Access Control Lists (ACLs) on printer objects. See the next section.

Refer to Chapter 2 in this document for detailed information about configuring ACL support.

NT Printing Support (version A.01.08)

These enhancements are new for version A.01.08. The CIFS/9000 Server now provides the following NT printing functionality:

- Printer driver files may be downloaded to Windows NT, 2000 and XP clients that do not have them
- Printer driver files may be uploaded from a Client’s disk to a CIFS/9000 Server that does not have them. This is done using the Windows NT, XP or Windows 2000 Add Printer Wizard

For detailed information about configuring printer support, please refer to Chapter 2 in this document.

Distributed File System (DFS) Server Functionality (version A.01.08)

These enhancements are new for version A.01.08. The CIFS/9000 Server now provides the following DFS functionality:

- A CIFS/9000 Server can act as a Distributed File System (DFS) server
- The Distributed File System (DFS) provides a way to separate the logical view of files and directories that users see from the actual physical locations of these network resources
- The DFS tree allows users to easily access any particular resource on the network server
- The CIFS/9000 DFS tree is accessible from the following types of DFS-aware clients:

  Windows NT
  Windows XP
  Windows 2000

- A DFS root directory can host DFS links in the form of symbolic links which point to other servers

For detailed information about setting up DFS support, please refer to Chapter 2 in this document.

Primary Domain Controller (PDC) Functionality (version A.01.08)

These enhancements are new for version A.01.08. Please refer to Chapters 4 and 5 in this document for detailed information about setting up and configuring a PDC. The CIFS/9000 Server now provides the following PDC functionality:

- Continue the support for joining a Samba server to the Windows NT domain as a member server
- Provide the ability to act as a Primary Domain Controller (PDC) for Windows clients which include Windows NT, XP and 2000
- Support the Domain logon feature for Windows NT 4.0 SP3+, Windows XP and Windows 2000 clients
- Support for Windows NT group and username mapping

- Support Windows NT logon scripts
- View resources on a Samba PDC using Microsoft's "Server manager for Domain" tool
- Support local and roaming profiles
- Support the specified logon home share to a Samba server

Exceptions:

Version A.01.08 of the CIFS/9000 Server does not support Security Accounts Manager (SAM) databases (containing NT user account information) nor does it provide any Backup Domain Controller (BDC) features, and will not support BDCs in a domain in which it is serving as a PDC.

Advantages of the Domain Model

The Windows NT domain model provides a number of advantages:

- Windows NT administrators may group workstations and servers under the authority of a domain controller
- Domain member servers may be centrally administered by using domains to group related machines
- The domain controller can be a central machine which performs all user logons and authentication

Primary Domain Controllers

The Primary Domain Controller (PDC) is responsible for several tasks within the domain. These include:

- Authenticating user logons for users and workstations that are members of the domain
- Acting as a centralized point for managing user account and group information for the domain
- A user logged on as the domain administrator can add, remove or modify account information on any machine that is part of the domain

Domain Members

- A domain member server can be a Windows NT Server, a Windows NT workstation, a Windows 2000 or XP machine or a CIFS/9000 machine
- Users on a domain member machine can access network resources within the domain. Some examples of these resources are file and printer shares and application servers
- Domain member servers do not participate in authenticating user logons

HP CIFS/9000 Server Documentation: Printed and Online

The full set of HP CIFS/9000 server documentation consists of one non-HP book available at most technical bookstores, and this printed and online HP CIFS/9000 server manual.

The HP manual is *Installing and Administering the CIFS/9000 Server*.

The non-HP book is: Using Samba, Robert Eckstein, David Collier-Brown and Peter Kelly (O'Reilly, 2000), ISBN: 1-56592-449-5.

NOTE

Please note that non-HP Samba documentation sometimes includes descriptions of features and functionality planned for future releases of Samba. The authors of these books do not always provide information indicating which features are in existing releases and which features will be available in future Samba releases.

Use the HP-provided Samba man pages or the SWAT help facility for the most definitive information on the HP CIFS/9000 server.

Documentation Availability by Topic

This section includes brief descriptions of major Samba topics.

CIFS/9000 Basics

The CIFS/9000 Basics section include information about the location of files on the server, installing CIFS/9000, configuring CIFS/9000, and starting and stopping CIFS/9000.

Location of Files on the Server

The default location of CIFS/9000 is */opt/samba*. In this case, the following directories should exist in the Samba directory: *bin/*, *docs/*, *script/*, *examples* /, HA/, *man/*, and *swat/*. Refer to the complete listing of CIFS/9000 Server files and directories in the Overview section in chapter 2.

The CIFS/9000 configuration files are in */etc/opt/samba. The CIFS/9000 log files and any temporary files are created* in */var/opt/samba*.

For more information about CIFS/9000 files and directories, refer to chapter 2 of this manual.

Installing CIFS/9000

The HP CIFS/9000 Server product is installed using the *swinstall* utility. The steps to install this product are documented in chapter 2 of this manual.

Configuring CIFS/9000

All the information needed to run the CIFS/9000 configuration script is provided in chapter 2 of this manual.

There are also other configuration options that you may want to include. These options include global configuration options, service configuration options, and browser configuration options.

For more detailed information about these options, refer to “Chapters 4, Disk Shares,” “Chapter 5, Browsing and Advanced Disk Shares,” and “Chapter 7, Printing and Name Resolution in *Using Samba*.

Starting and Stopping CIFS/9000

Use the following commands to start and stop CIFS/9000:

/opt/samba/bin/startsmb

/opt/samba/bin / stopsmb

These commands are described in chapter 2 in this manual.

Other CIFS/9000 Topics

The Other CIFS/9000 Topics section includes information about CIFS/9000 scripts, adding and removing printers, utilities, the SWAT configuration tool, a browser description, troubleshooting and NIS and CIFS/9000.

CIFS/9000 Scripts

In *Using Samba*, check Appendix D, "Summary of Samba Daemons and Commands," for detailed information about the command-line parameters for Samba programs such as smbd, nmbd, smbstatus and smbclient. There is also information about user scripts in Chapters 4 and 5.

Setting Up Printers

For an explanation of the process of how printing takes place on a CIFS/9000 server, print commands, printing variables, and a minimal printing setup, refer to chapter 7, "Printing and Name Resolution" in *Using Samba*. This chapter also contains more in-depth information about Samba printing options and print to Windows client printers.

SWAT Configuration Tool

The Samba Web Administration Tool (SWAT) is a GUI which you can use to set up or change your Samba configuration in the *smb.conf* file. You will be able to change information in the following areas: globals, shares, printers, status, view (smb.conf), and password.

For information about SWAT, refer to chapter 1 of *Using Samba*.

Browsing

Browsing gives you the ability to view the servers and shares on your network. Samba provides over fourteen different browsing options. HP, however, recommends that you start with the default values.

Refer to "Chapter 5, Browsing and Advanced Disk Shares" in *Using Samba* for a description of all browsing options.

Troubleshooting

In "Chapter 9, Troubleshooting Samba" of *Using Samba*, you will find a description of the Samba tool bag. It includes a list of tools to be used when troubleshooting Samba. These tools include: Samba log files and Unix utilities such as *trace* and *tcpdump*. It also includes a fault tree to fix problems that occur during Samba installation or reconfiguration.

There are also several excellent tools that are very useful for troubleshooting on HP systems. For example, `nettl` and `netfmt` are used for tracing activity specifically on HP-UX systems. Microsoft's `NetMon` has become a widely used tool for use on WIndows 2000 servers.

NIS and CIFS/9000 CIFS/9000 now works with NIS and NIS+. For detailed information on special options, refer to chapters 2 and 6 in *Using Samba*.

CIFS/9000 Documentation Roadmap

Use the following road map to locate the Samba and CIFS/9000 documentation that you need.

Table 1-1

CIFS/9000 Product	Document Title: Chapter: Section
Server Description	Installing and Administering the CIFS/9000 Server: Chapter 1, "Introduction to the CIFS/9000 Server" Samba Meta FAQ No. 2, "General Information about Samba" Samba FAQ No. 1, "General Information" Samba Server FAQ: No. 1, "What is Samba" *Using Samba*: Chapter 1, "Learning the Samba"
Client Description	Samba Man Page: samba(7) Installing and Administering the CIFS/9000 Client: Chapter 1, "Introduction to the CIFS/9000 Client"
HP Add-on Features	Installing and Administering the CIFS/9000 Server: Chapter 1 "Introduction to the CIFS/9000 Server," Section: "HP CIFS/9000 Enhancements to the Samba Server Source" and Chapter 3, "Access Control Lists (ACLs)." Installing and Administering the CIFS/9000 Client: Chapter 1, "Introduction to the CIFS/9000 Client,". Sections: "HP CIFS Extensions" and "ACL Mappings."

Table 1-1 (Continued)

CIFS/9000 Product	Document Title: Chapter: Section
Server Installation	Installing and Administering the CIFS/9000 Server: Chapter 2. “Installing and Configuring the CIFS/9000 Server” Samba FAQ: No 2, “Compiling and Installing Samba on a UNIX Host.”
Client Installation	Installing and Administering the CIFS/9000 Client: Chapter 2. “Installing and Configuring the CIFS/9000 Client”
Samba GUI Administration Tools	*Using Samba*: Chapter 2, “Installing Samba on a Unix System”
Server Configuration	Installing and Administering the CIFS/9000 Server: Chapter 2, “Installing and Configuring the CIFS/9000 Server”
Client Configuration	Installing and Administering the CIFS/9000 Client: Chapter 2, “Installing and Configuring the CIFS/9000 Client”
Configuration: PAM	Installing and Administering the CIFS/9000 Client: Chapter 6, “Authentication” HP-UX Man page: pam(3) HP-UX Man page: pam.conf
Server: Starting & Stopping Client: Starting & Stopping	Installing and Administering the CIFS/9000 Server, Chapter 2 Installing and Administering the CIFS/9000 Client, Chapter 2.
Server: Samba Scripts	*Using Samba:* Appendix D, “Summary of Samba Daemons and Commands”

Table 1-1 (Continued)

CIFS/9000 Product	Document Title: Chapter: Section
SMB & CIFS File Protocols	Samba Meta FAQ No. 3, “About the SMB and CIFS Protocols”
SMB & CIFS Network Design	*Using Samba:* Chapter 1, “Learning the Samba” Samba Meta FAQ No. 4, “Designing an SMB and CIFS Network”
Samba Man Pages	http://us1.samba.org/samba/docs Samba Meta FAQ No. 1, “Quick Reference Guide to Samba Documentation”
Server Utilities	*Using Samba:* Appendix D, “Summary of Samba Daemons and Commands”
Client Utilities	Installing and Administering the CIFS/9000 Client: Chapter 4, “CIFS/9000 Client Utilities”
Server Printing	*Using Samba:* Chapter 7, “Printing and Name Resolution”
Server Browsing	Using Samba: “Chapter 5, Browsing and Advanced Disk Shares”
Server Security	*Using Samba:* Chapter 6, “Users Security and Domains

Table 1-1 (Continued)

CIFS/9000 Product	Document Title: Chapter: Section
Server Troubleshooting	Installing and Administering the CIFS/9000 Server: Chapter 3, "Troubleshooting the CIFS/9000 Client" *Using Samba*, "Chapter 9, Troubleshooting Samba" Samba FAQs No. 4, "Specific Client Application Problems" and No 5, "Miscellaneous" DIAGNOSIS.txt in the */opt/samba*/docs directory
Client Troubleshooting:	Samba Man page: debug2html(1), smbd(8), nmbd(8), smb.conf(5)
	Installing and Administering the CIFS/9000 Client: Chapter 3, "Troubleshooting the CIFS/9000 Client"

CIFS/9000 Server File and Directory Information

This section briefly describes the important directories and files that comprise the CIFS Server.

Table 1-2 CIFS/9000 Server Files and Directories

File/Directory	Description
/opt/samba	This is the base directory for most of the CIFS/9000 Server.
/opt/samba_src	This is the directory that contains the source code for the CIFS/9000 Server (if the source bundle was installed).

Table 1-2 CIFS/9000 Server Files and Directories (Continued)

File/Directory	Description
/opt/samba/bin	This is the directory that contains the binaries for CIFS/9000 Server, including the daemons and utilities.
/opt/samba/docs	This is the directory that contains documentation in various formats including html (htmldocs) and text (textdocs).
/opt/samba/examples	This directory contains example *smb.conf* files, example scripts and other utilities, among other things.
/opt/samba/man	This directory contains the man pages for CIFS/9000 Server.
/opt/samba/script	This directory contains various scripts which are utilities for the CIFS/9000 Server.
/opt/samba/swat	This directory contains html and image files which the Samba Web Administration Tool (SWAT) needs.
/opt/samba/HA	This directory contains example High Availability scripts, configuration files, and README files.
/var/opt/samba	This directory contains the CIFS/9000 Server log files as well as other dynamic files that the CIFS/9000 Server uses, such as lock files.

Table 1-2 CIFS/9000 Server Files and Directories (Continued)

File/Directory	Description
/etc/opt/samba	This directory contains configuration files which the CIFS/9000 Server uses, primarily the *smb.conf* file.
/etc/opt/samba/smb.conf	This is the main configuration file for the CIFS/9000 Server which is discussed in great detail elsewhere.
/etc/opt/samba/smb.conf.default	This is the default *smb.conf* file that ships with the CIFS/9000 server. This can be modified to fit your needs.
/opt/samba/COPYING, */opt/samba_src/COPYING*, */opt/samba_src/samba/COPYING*	These are copies of the GNU Public License which applies to the CIFS/9000 Server.
/sbin/init.d/samba	This is the script that starts CIFS/9000 Server at boot time and stops it at shutdown (if it is configured to do so).
/etc/rc.config.d/samba	This text file configures whether the CIFS/9000 server starts automatically at boot time or not.
/sbin/rc2.d/S900samba, */sbin/rc1.d/K100samba*	These are links to */sbin/init.d/samba* which are actually executed at boot time and shutdown time to start and stop the CIFS/9000 Server, (if it is configured to do so).

2 Installing and Configuring the CIFS/9000 Server

This chapter describes the procedures to install and configure the HP CIFS/9000 Server software. It contains the following sections:

- CIFS/9000 Server Requirements and Limitations
- Step 1: Installing HP CIFS/9000 Server Software
- Step 2: Running the Configuration Script
- Step 3: Modify the Configuration
- Step 4: Starting the CIFS/9000 Server

NOTE If the CIFS/9000 Server software has been pre-installed on your system, you may skip Step 1 above and go directly to "Step 2: Running the Configuration Script"

NOTE You can download the most recent version of CIFS/9000 Server from the *www.software.hp.com* website.

NOTE You can find the most recent and most complete version of CIFS/9000 documentation on the *www.docs.hp.com* website.

CIFS/9000 Server Requirements and Limitations

Prior to installing the CIFS/9000 product, check that your system can accommodate the following product requirements and limitations.

HP-UX 11.0 Memory and Disc Requirements

Although an 11.x 32-bit and 64-bit HP-UX system can boot with as little as 64MB RAM and 1GB of disc space, the performance of such a configuration would be prohibitive. The HP recommended minimums are as follows

- 11.x 32-bit: 128MB RAM, 1-2GB disc
- 11.x 64-bit: 512MB RAM, 2-3GB disc

Updated CIFS/9000 Server Memory Requirements for versions A.01.05 and later.

As of version A.01.05, the CIFS/9000 Server processes increased their base use of system memory by 20 percent. This represents an increase of approximately 100KB *per smbd process* over and above a base of 500KB. The increased memory footprint is the result of new caching mechanisms to improve performance.

In addition to the base memory increase, the smbd process may now also allocate memory for specialized caching requirements as needed. The size and timing of these memory allocations vary widely depending on the client type and the resources being accessed. A single smbd process may temporarily use up to 2.5MB of memory. However, most client access patterns will not trigger such specialized caching. System administrators should routinely monitor memory utilization in order to evaluate this new dynamic memory behavior.

You may need to adjust HP-UX server memory configurations to accommodate these changes when upgrading from previous versions

CIFS/9000 Server Installation Requirements

The CIFS/9000 server product requires about 15MB of disc space for product installation. The CIFS/9000 server product is composed of the following:

- CIFS/9000 server source code files: 5 MB
- CIFS/9000 File and Print Services: 12MB

CIFS/9000 Server Memory and Disc Requirements

Refer to Chapter 6, “HP-UX Configuration for CIFS/9000” in this manual for more detailed information.

Step 1: Installing HP CIFS/9000 Server Software

CIFS/9000 Server Upgrades:

If you are upgrading an existing CIFS/9000 Server configuration, HP recommends that you create a backup copy of your current environment. The SD install procedure may alter or replace your current configuration files. All files under */var/opt/samba* and */etc/opt/samba* must be saved in order to ensure that you will be able to return to your current configuration, if necessary. For example:

```
$ stopsmb
$ mkdir /tmp/cifs_save
$ tar -cvf /tmp/cifs_save/var_backup.tar /var/opt/samba
$ tar -cvf /tmp/cifs_save/etc_backup.tar /etc/opt/samba
```

Do not use the `-o` option with the `tar` command. This will ensure proper file ownership.

If a problem with the upgrade does occur, use SD to remove the entire CIFS/9000 Server product and reinstall your current version. Once this is done, you may restore the saved configuration files. For example:

```
$ tar -xvf /tmp/cifs_save/var_backup.tar
$ tar -xvf /tmp/cifs_save/etc_backup.tar
```

This procedure is not intended to replace a comprehensive backup strategy that includes user data files.

Overview:

Installation of the HP CIFS/9000 Server software includes loading the HP CIFS/9000 Server filesets using the *swinstall(1M)* utility, completing the CIFS/9000 configuration procedures, and starting Samba using the *startsmb* script.

Procedure:

Follow the steps below to install the HP CIFS/9000 Server software using the HP-UX *swinstall* program.

1. Log in as **`root`**.
2. Insert the software media (disk) into the appropriate drive.

3. Run the *swinstall* program using the command:

   `swinstall`

   This opens the Software Selection Window and Specify Source Window.

4. Change the Source Host Name if necessary, enter the mount point of the drive in the Source Depot Path field, and activate the **OK** button to return to the Software Selection Window. Activate the Help button to get more information.

   The Software Selection Window now contains a list of available software bundles to install.

5. Highlight the HP CIFS/9000 Server software for your system type.

6. Choose `Mark for Install` from the "Actions" menu to choose the product to be installed. With an exception of the man pages and user's manual, you must install the complete CIFS/9000 product.

7. Choose `Install` from the "Actions" menu to begin product installation and open the Install Analysis Window.

8. Activate the **OK** button in the Install Analysis Window when the Status field displays a Ready message.

9. Activate the **Yes** button at the Confirmation Window to confirm that you want to install the software. *swinstall* displays the Install Window.

   View the Install Window to read processing data while the software is being installed. When the Status field indicates Ready and the Note Window opens.

   swinstall loads the fileset and runs the control scripts for the fileset. Estimated time for processing: 3 to 5 minutes.

10. Check the log files in */var/adm/sw/swinstall.log* and */var/adm/sw/swagent.log* to make sure the installation was successful.

Step 2: Running the Configuration Script

Prior to running the configuration script, you must obtain the name of your domain or workgroup, choose either a “workgroup model” or “domain security model” role for your server and decide which security level you would like to use. After you have this information, run the *samba_setup* configuration script.

1. Run the Samba configuration script using the command below.

   ```
   /opt/samba/bin/samba_setup
   ```

   To specify a domain role and an authentication type, enter the *number* listed to the left of your choice. Answer the other questions prompted by the script. The questions will vary according to the workgroup or domain role that you selected.

2. Choose a domain role for your server.

   With NT, Microsoft Corporation added the domain security model to the more primitive workgroup model. Domain security offers centralized administration and security. CIFS/9000 Servers not only support the workgroup model but can also play the role of Primary Domain Controller (PDC) or Domain Member Server in the domain security model.

   `Samba_setup` will ask you to choose Primary Domain Controller, Domain Member Server, or Workgroup roles.

   - Primary Domain Controllers perform the machine account and authentication services which enables domain-wide logons. Domain logons are convenient because users can log on to the domain with one logon and password rather than logging on to each individual server in the domain. See Chapters 4 and 5 for more information about CIFS/9000 Server PDC features. Samba_setup will configure CIFS/9000 Server PDCs to use user-level security for you.
   - Domain Member Servers participate in domain security by forwarding logon requests to the PDC for authentication. Samba_setup will configure CIFS/9000 Server Domain Member Servers to use domain-level security for you.

- Workgroups do not utilized the centralized authentication of domains. Samba_setup will require workgroups to choose either server, share, or user-level security.

Since there are many important aspects of workgroup and domain architecture too lengthy to be discussed here, you should consult some of the many books or white papers available through the world-wide web and book stores if you are not already familiar with the subject.

3. Select your authentication security type.

   Samba supports four types of security: Domain-level security, Server-level security, User-level security, and Share-level security. You must select one of these security types for your server prior to running the configuration script.

   - Domain-level security: When this type of security is used, Samba responds as a member of a Windows domain and checks the password against the information contained in the Windows NT domain controller.
   - Server-level security: When this security type is specified, password authentication is handled by another SMB password server. When a client attempts to access a specific share, Samba checks that the user is authorized to access the share. Samba then validates the password via the SMB password server.
   - User-level security: When this security type is specified, each share is assigned specific users. When a request is made for access, Samba checks the user's user name and password against a local list of authorized users and only gives access if a match is made.
   - Share-level security: When this security type is specified, each share (directory) has at least one password associated with it. Anyone with a password will be able to access the share. There are no other access restrictions.

     You might use multiple passwords when you want different users to have different types of access (read-only, read-write, etc).

   These security types are described in detail in "Chapter 6, Users, Security, and Domains" of *Using Samba* by Eckstein, Collier-Brown and Kelly.

This information will be requested by the configuration script in Step 4: Starting the CIFS/9000 Server, located later in this chapter.

4. Enter the name of the domain or workgroup that you want this server to be part of.

The script will modify the *smb.conf* file according to the information that you have entered.

For in-depth information about configuring disk shares; browsing; users, security and domains; and printing and name resolution; refer to chapters 4, 5, 6, and 7 in *Using Samba* by Eckstein, Collier-Brown and Kelly.

Step 3: Modify the Configuration

CIFS/9000 Server requires configuration modifications for the following functionality:

- ACL Support
- Case Sensitivity for the Client and Server for UNIX Extensions
- DOS Attribute Mapping
- Print Services for version A.01.07
- Print Services for version A.01.08 (current version)
- Distributed File System (DFS) Support
- Configure MC/ServiceGuard High Availability (HA)
- German Character Support
- Japanese Character Support

Configure ACL Support (for version A.01.07)

Two ACL schemes are currently supported: *unix* UNIX file permissions and *hpux_posix* VxFS POSIX ACLs on HP-UX.

Example values are shown below:

- Example one:

  ```
  acl schemes = unix
  ```

  This is the default ACL scheme. This ignores UNIX ACL capabilities and uses UNIX file permissions.

- Example two:

  ```
  acl schemes = none
  ```

  This example turns off all ACL support for the share and an error will be returned whenever the client tries to get to or set ACL information on any file system on the share.

- Example three:

  ```
  acl schemes = hpux_posix
  ```

This example supports only VxFS POSIX ACLs on the entire share. Attempts to get or set ACLs from the client will only succeed if VxFS POSIX ACLs are supported on that file system. If only UNIX permissions are supported, attempts to get or set ACLs from the client will fail.

- Example four:

  ```
  acl schemes = hpux_posix unix
  ```

  CIFS/9000 will attempt to use VxFS POSIX ACLs. If ACLs are not present, it will use UNIX permissions.

Configure ACL Support (for version A.01.08)

CIFS/9000 Server, version A.01.08, provides a share level variable called "nt acl support." The possible values for this variable are "yes" and "no." This variable defaults to "yes." Using this variable, users can turn on/off ACL support on a per-share basis. Refer to chapter 3 in this manual for more information about ACLs.

IMPORTANT VxFS POSIX ACL file permissions only work when JFS 3.3 or disk layout version 4 is installed on your system. Learn how to install JFS 3.3 on HP-UX 11.0 in the *HP JFS 3.3 and HP OnLineJFS 3.3 Release Notes* (MPN B3929-90007), located at www.docs.hp.com. Learn about installing and upgrading disk layout versions in the *HP JFS 3.3 and HPOnLineJFS 3.3 VERITAS File System 3.3 System Administrator's Guide* (MPN B3929-90011) also located at www.docs.hp.com.

Configure Case Sensitivity

By default, the HP CIFS Server is configured to be case insensitive, like DOS and NT.

NOTE HP recommends that when using CIFS Extensions for UNIX, both the CIFS Client and Server be configured to be case sensitive.

For the CIFS Server, edit the server configuration file: */etc/opt/samba/smb.conf* as follows.

```
case sensitive = yes
```

For the CIFS Client, in the */etc/opt/cifsclient/cifsclient.cfg* file, ensure the following default is set:

```
caseSensitive = yes
```

Configure DOS Attribute Mapping

There are three parameters, *map system*, *map hidden*, and *map archive*, that can be configured in Samba to map DOS file attributes to *owner*, *group*, and *other* execute bits in the UNIX file system.

When using the CIFS Client, you may want to have all three of these parameters turned off. If the *map archive* parameter is on, any time a user writes to a file, the owner execute permission will be set. This is usually not desired behavior for HP CIFS clients or UNIX clients in general.

By default, *map system* and *map hidden* are off, and *map archive* is on.

To turn *map archive* off, modify */etc/opt/samba/smb.conf* as follows:

```
map archive = no
```

Configuring Print Services for CIFS/9000 Version A.01.07

This section provides information about configuring Print Services on systems running CIFS/9000 version A.01.07. Please refer to the next section if you are running CIFS/9000 version A.01.08.

Configure Print Services

The minimal printing setup is shown below. Refer to chapter 7 in *Using Samba* for more detailed information on how to set up printing in Samba servers.

To configure a printer share, modify */etc/opt/samba/smb.conf* as follows:

```
printable=yes
printer=printer_name_string
```

Where *printer_name_string* is the name of an HP-UX-defined printer under the control of the LP spooler.

Configure A Printer Share

This is a special share to automatically create printing services. Refer to chapter 7 in *Using Samba* for more detailed information on how to set up printing in Samba servers.

If you create a share named *[printers]* in the *smb.conf* file, the server will automatically read in your printer capabilities file and create a printing share for each printer that appears in that file.

Add the following information to the global and printers sections of the *smb.conf* file:

```
[printers]
  printable=yes
```

Manually Set Up Printer Drivers

Each client needs to install the appropriate driver for each printer it wants to use. Refer to chapter 7 in *Using Samba* for more detailed information on how to set up printing in Samba servers.

Invoke the Windows Add Printer Wizard dialog by double-clicking on the printer icon in the Network Neighborhood.

Enter the name of the printer. If you selected an uninstalled printer, Windows will ask you to select the printer manufacturer and model.

Windows should load the appropriate driver.

Automatically Set Up Printer Drivers

Printer drivers can be automatically set up for a specific printer. There are four steps:

- Install the drivers for the printer on a Windows client.
- Create a printer definition file from the information on a Windows machine.
- Create a PRINTER$ share where the resulting driver files can be placed.
- Modify the *smb.conf* file

Refer to chapter 7 in *Using Samba* for more detailed information on how to set up printing in Samba servers.

Install Printer Drivers. Install the drivers using a Windows 95/98 client only. Other versions of Windows clients will be supported in future releases. The printer does not have to be attached to the machine to install the drivers.This step is getting the appropriate driver files into the Windows directory.

Go to the Printers windows of *My Computer* and double-click on the *Add Printer* icon.

Follow the *Add Printer Wizard* dialogs, providing the name or manufacturer and model of the printer.

Create a Printer Definition File. Copy the following four files from a Windows client:

```
C:\WINDOWS\INF\MSPRINT.INF
C:\WINDOWS\INF\MSPRINT2.INF
C:\WINDOWS\INF\MSPRINT3.INF
C:\WINDOWS\INF\MSPRINT4.INF
```

These files contain specific printer driver files. If the printer driver starts with the letter A-K, use either *MSPRINT* or *MSPRINT3*. If it begins with L-Z, user *MSPRINT2* or *MSPRINT4* in the next step.

Use the *make_printerdef* script located in */opt/samba/bin* Directory and the appropriate printer driver INF file to create a printer definition file:

```
$make_printerdef MSPRINT3.INF HP DeskJet 560C Printer
printers.def
```

Create a PRINTER$ Share. Create a PRINTER$ share in the *smb.conf* file that points to an empty directory on the CIFS server as follows:

```
[PRINTER$]
  path = /opt/samba/print
```

This is where the resulting driver files will be placed.

Copy the files noted in step 2 to this location. Typically these files can be found in the *C:\WINDOWS\SYSTEM* directory.

Copy the *printers.def* file that you created in step 2 to this location as well.

Modify the smb.conf file. Modify the *smb.conf* file by adding three options:

- Printer driver
- Printer driver file
- Printer driver location

Example *smb.conf* entries:

```
[global]
  printer driver file = /opt/samba/print/printers.def

[hpdeskjet]
  printer driver=HP DeskJet 560C Printer
  printer driver=Hp DeskJet 560C Printer
  printer driver location=\\%L\PRINTERS$
```

Configuring Print Services for CIFS/9000 Version A.01.08

This section provides information about configuring Print Services on systems running CIFS/9000 version A.01.08. Please refer to the previous section if you are running CIFS/9000 version A.01.07.

These enhancements are new for version A.01.08. The CIFS/9000 Server now provides the following NT printing functionality:

- Printer driver files may be downloaded to Windows NT, 2000 and XP clients that do not have them
- Printer driver files may be uploaded using the Windows NT/XP/2000 `Add Printer` wizard
- Support for NT Access Control Lists (ACL) on printer objects

Information about setting up and configuring each of the Print Services (except ACLs) is shown in the following sections. Information about configuring ACL Support is discussed in a previous section.

Configuring a [printers] share

The following is a minimal printing setup. Use either *one* of the following two procedures to create a [printers] share:

1. SWAT (Samba Administration Tool)

-or-

2. Create a [printers] share in the */etc/opt/samba/smb.conf* file. Refer to the following example:

```
[hpdeskjet]
  path = /tmp
  printable = yes
```

Where “hpdeskjet” is the name of the printer to be added.

Creating a [printers] share

Configure a [printers] share in the */etc/opt/samba/smb.conf* file. Refer to the following example:

```
[printers]
  path = /tmp
  printable = yes
  browseable = no
```

This share is required if you want the printer's list to be displayed in SWAT, which is not defined in the *smb.conf* file, but exists on the CIFS/9000 Server. If this share is not defined, the printer's list will display only those printer shares which are defined in the *smb.conf* file.

Setup Server for automatically uploading printer driver files

In order to add a new driver to your Samba host using version A.01.08 of the software, one of two conditions must hold true:

1. The account used to connect to the Samba host must have a uid of 0 (i.e. a root account), or...
2. The account used to connect to the Samba host must be a member of the printer admin list. This will require a `[global]` *smb.conf* parameter as follows:

```
printer admin = netadmin
```

The connected account must still possess access to add files to the subdirectories beneath [print$]. Keep in mind that all files are set to ‘read only’ by default, and that the ‘`printer admin =`’ parameter must also contain the names of all users or groups that are going to be allowed to upload drivers to the server, not just ‘`netadmin`’.

The following is an example of the other parameters required:

1. Create a [print$] share in the *smb.conf* file that points to an empty directory named "/etc/opt/samba/printers" on the CIFS/9000 Server. Refer to the following example:

```
[print$]
  path = /etc/opt/samba/printers
  browseable = yes
  guest ok = yes
  read only = yes
  write list = netadmin
```

   In this example, the parameter "write list" specifies that administrative lever user accounts will have write access for updating files, on the share.

2. Create the subdirectory tree, under the [print$] share, for each architecture that needs to be supported. Refer to the following example:

```
cd /etc/opt/samba/printers
mkdir W32X86
mkdir Win40
```

   There are two possible locations (subdirectories) for keeping driver files, depending upon what version of Windows the files are for:

   For Windows NT, XP or Windows 2000 driver files, the files will be stored in the */etc/opt/samba/printers/W32X86* subdirectory.

   For Windows 9x driver files, the files will be stored in the */etc/opt/samba/printers/Win40/0* subdirectory.

Setup Client for automatically uploading of printer drivers

Printer driver files can be automatically uploaded from disk to the printers on a CIFS/9000 Server. Here are the steps:

1. Invoke the Windows Add Printer Wizard dialog by double-clicking on the printer icon in Network Neighborhood.
2. Enter the printer share name for an installed printer on the CIFS/9000 Server. Viewing the printer properties which has the default driver assigned will result in the error message:

```
Device settings can not be displayed. The driver for the
specified printer is not installed, only spooler
properties will be displayed. Do you want to install the
driver now?
```

3. Click “yes” in the error dialog and the printer properties window will be displayed, with an APW.
4. Select the printer driver e.g. hp LaserJet 5i. You will be asked for the driver files. Give the path where the driver files are located. The driver files will be uploaded from the disk, and stored into the subdirectories under the [print$] share.

Migrating Printing Services From version A.01.07 to A.01.08

The following are some typical reasons for migrating from a CIFS/9000 Server, version A.01.07, to version A.01.08:

- If you do not intend to use the new Windows NT/XP/2000 print driver support feature, nothing should be done. All of the existing configuration parameters for printer services will continue to work the same way.
- If you want to take advantage of the new NT/XP/2000 printer driver support, but do not want to migrate the Windows 9x drivers to the new setup, then use the existing *printers.def* file.
- If you install a Windows 9x driver for a printer on a CIFS/9000 Server, the new setup information will take precedence and the three old parameters (`printer driver`, `printer driver file` and `printer driver location`) will be ignored.
- If you have a printer installed on a CIFS/9000 Server version A.01.07 or below, and you migrate to Server version A.01.08, you must reboot the Windows client in order to make the printer work under version A.01.08.

Setting Up Distributed File System (DFS) Support

This section will provide the procedures for:

- Setting up a DFS Tree on a CIFS/9000 Server
- Setting up DFS Links in the DFS root directory on a CIFS/9000 Server

NOTE HP does not recommend filesharing of the root. Only subdirectories under the root should be set up for filesharing.

Setting Up a DFS Tree on a CIFS/9000 Server

After the DFS Tree is set up using this procedure, users on DFS clients can browse the DFS tree located on the CIFS/9000 Server at *\\servername\DFS*.

1. Select a CIFS/9000 Server to act as the Distributed File System (DFS) root directory.
2. Configure a CIFS/9000 server as a DFS server by modifying the *smb.conf* file to set the global parameter `host msdfs` to `yes`. Example:

   ```
   [global]
     host msdfs = yes
   ```

3. Create a directory to act as a DFS root on the CIFS/9000 Distributed File System (DFS) Server.
4. Create a share and define it with the parameter `path = directory of DFS root` in the *smb.conf* file. Example:

   ```
   [DFS]
     path = /export/dfsroot
   ```

5. Modify the *smb.conf* file and set the `msdfs root` parameter to `yes`. Example:

   ```
   [DFS]
     path = /export/dfsroot
     msdfs root = yes
   ```

Setting Up DFS Links in the DFS Root Directory on a CIFS/9000 Server

A Distributed File System (DFS) root directory on a CIFS/9000 Server can host DFS links in the form of symbolic links which point to other servers.

Before setting up DFS links in the DFS root directory, you should set the permissions and ownership of the root directory so that only designated users can create, delete or modify the DFS links.

Symbolic link names should be all lowercase. All clients accessing a DFS share should have the same user name and password.

An example for setting up DFS links follows:

1. Use the `ln` command to set up the DFS links for “linka” and “linkb” on the */export/dfsroot* directory. Both “linka” and “linkb” point to other servers on the network. Example commands:

   ```
   cd /export/dfsroot
   chown root /export/dfsroot
   chmod 775 /export/dfsroot
   ln -S msdfs:serverA\\shareA linka
   ln -S msdfs:serverB\\shareB serverC\\shareC linkb
   ```

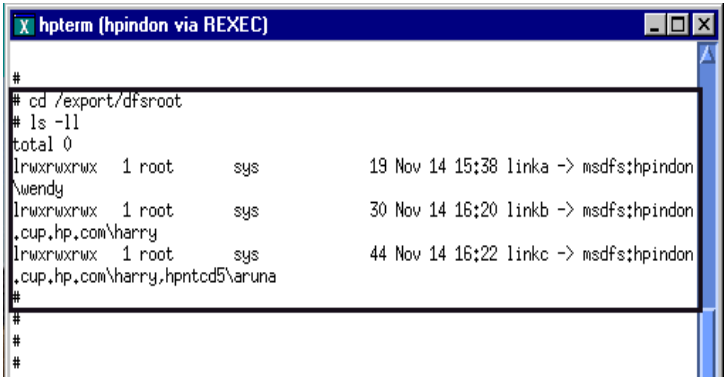
2. If you use the `ls -l` command on the */export/dfsroot* directory, it should show an output similar to this one:

   ```
   lrwxrwxrwx l root sys 24 Oct 30 10:20
   linka -> msdfs:serverA\\shareA
   lrwxrwxrwx l root sys 30 Oct 30 10:25
   linkb -> msdfs:serverB\\shareB, serverC\\shareC
   ```

   In this example, “serverC” is the alternate path for “linkb”. Because of this, if “serverB” goes down, “linkb” can still be accessed from “serverC”. “linka” and “linkb” are share names. Accessing either one will take users directly to the appropriate share on the network.

   Refer to the following screen snapshot for an example:

Figure 2-1 Link Share Names Example



MC/ServiceGuard High Availability Support

Highly Available CIFS/9000 Server allows the CIFS/9000 Server product to run on an MC/ServiceGuard cluster of nodes. MC/ServiceGuard allows you to create high availability clusters of HP 9000 server computers.

Template files for version A.01.08 have been revised to allow any number of cluster nodes and other advantages over previous schemes.

Follow the configuration procedures provided in Chapter 6.

Configure for German Character Support

Modify the parameters below in the *smb.conf* file for German character support:

```
character set = ISO8859-1
client code page = 850
```

In order to view the file and directory names and contents correctly from the UNIX side, you must set the locale to ISO 8859-1 as follows:

```
export LANG=de_DE.iso88591
```

Refer to the Internationalization section later in this chapter for more detailed information.

Configure for Japanese Character Support

To enable CIFS/9000 Japanese capabilities, start CIFS/9000 with the *smb.conf* variables set as follows:

```
codingsystem = SJIS
client code page = 932
```

In order to view the file and directory names and contents correctly from the UNIX side, you must set the locale to Shift-JIS like this:

```
export LANG=ja_JP.SJIS
```

Refer to the Internationalization section later in this chapter for more detailed information.

Step 4: Starting the CIFS/9000 Server

Run the script below to start Samba.

/opt/samba/bin/startsmb

When the command successfully starts Samba, a message is displayed indicating the specific processes that have been started. When the script is successful, the exit value is 0. If the script fails, the exit value is 1.

Samba installation and configuration are complete.

To stop the Samba server, run:

/opt/samba/bin/stopsmb

When the script is successful, the exit value is 0. If the script fails, the exit value is 1.

Automatically Starting the CIFS/9000 Server

When the CIFS/9000 Server is installed, by default it will not be configured to automatically start when the system boots up and stop when the system shuts down. You can enable this feature by doing the following:

1. Edit the /etc/rc.config.d/samba file.
2. Change the last line of the file to: RUN_SAMBA=1.
3. Save the file.

If you later decide to disable the automatic start feature, change the last line back to:

```
RUN_SAMBA=0
```

Other Samba Configuration Issues

Translate Open-Mode Locks into HP-UX Advisory Locks

The CIFS/9000 Server A.01.07, and subsequent versions, can translate open mode locks into HP-UX advisory locks. This functionality prevents HP-UX processes from obtaining advisory locks on files with conflicting open mode locks from CIFS clients. This also means CIFS clients cannot open files that have conflicting advisory locks from HP-UX processes.

You must change the `map share modes` setting in `smb.conf` to **yes** to translate open mode locks to HP-UX advisory locks. The default setting of `map share modes` is **no**.

Performance Tuning using Change Notify

This section describes performance tuning using the *Change Notify* feature and internationalization.

The Samba Server supports a new feature called *Change Notify*. *Change Notify* provides the ability for a client to request notification from the server when changes occur to files or subdirectories below a directory on a mapped file share. When a file or directory which is contained within the specified directory is modified, the server notifies the client. The purpose of this feature is to keep the client screen display up-to-date in Windows Explorer. The result: if a file you are looking at in Windows Explorer is changed while you are looking at it, you will see the changes on the screen almost immediately.

The only way to implement this feature in Samba is to periodically scan through every file and subdirectory below the directory in question and check for changes made since the last scan. This is a resource intensive operation which has the potential to affect the performance of Samba as well as other applications running on the system. Two major factors affect how resource intensive a scan is: the number of directories having a Change Notify request on them, and the size of those directories. If you have many clients running Windows Explorer (or other file browsers) or if you have directories on shares with a large number of files and/or subdirectories, each scan cycle might be very CPU intensive.

To counteract the possible performance impact, you can control how often Samba scans for changes in the directories it has been requested to monitor. The parameter that controls how often Samba scans for changes is *Change Notify Timeout*. The parameter value represents the number of seconds between the start of each scanning cycle. The default value is 60. So, if your system takes 55 seconds to complete the scan of all the directories with *Change Notify requests*, it would be under a heavy load at nearly all times.

You can increase the *Change Notify Timeout* value to a larger number to decrease how often these *Change Notify* directory scans are done. The trade off is that your clients will take longer to *see* that changes were made in the directories that they have placed Change Notify requests on. You will have to decide what the right trade-off is: performance loss or slow updates to client file browsers.

Internationalization

This section describes European and Japanese character support for the CIFS/9000 server.

European Character Support

CIFS/9000 provides European character support for Windows 95, XP and NT clients. CIFS/9000 also supports MS-DOS and Windows 3.x clients using the PC850 code page. To enable European character support for Windows 95, XP and NT, which includes applications running in DOS-PROMPT windows under these environments, the CIFS/9000 server must be started with the *smb.conf* variables *character set* and *client code page* set correctly.

For configuration examples, refer to "Step 4, Modifying the Configuration in this chapter".

In order to view the file and directory names and contents correctly from the UNIX side for various languages, you must set the locale to the appropriate value. Here are two examples:

```
export LANG=de_DE.iso88591
-or-
export LANG=de_DE.iso88915@euro
```

The CIFS/9000 server must be restarted for the *character set* or *client code page* parameters change to take effect. You cannot administer resource permissions on shares that contain German umlauts in their names from the Windows 95 Explorer. Permissions can be administered if the resource is accessed through the Network Neighborhood. Microsoft has acknowledged this behavior but has indicated that it is by design and no fixes will be forthcoming.

Japanese Character Support

CIFS/9000 supports Japanese character sets as follows:

- CIFS/9000 supports Japanese only in Shift-JIS encoding. The EUC codeset is not supported.
- The following clients have been tested with CIFS/9000 with Japanese:

  - — Windows 95 Japanese
  - — Windows NT 4.0 Japanese
- To enable CIFS/9000 Japanese capabilities, start CIFS/9000 with *smb.conf* variables set as follows:

  ```
  codingsystem = SJIS
  client code page = 932
  ```
- Japanese is supported for the following:
  - — File/directory names
  - — File contents
  - — Printing

  Japanese is not supported for share names, domain names, user login names or user passwords.

  In order to view the file and directory names and contents correctly from the UNIX side, you must set the locale to Shift-JIS like this:

  ```
  export LANG=ja_JP.SJIS
  ```
- DOS *utilities uchmod.exe*, *ud.exe*, *uren.exe*, and *udir.exe* are not supported for Japanese file/directory name. The bundled server management tools for Windows NT or XP workstation and Windows 95 are not supported on Japanese Windows NT workstation(J) and Windows 95(J).
- CIFS/9000 cannot handle the following characters as file or directory names from Windows 95(J) clients. 8260 - 8279 (SJIS code)
- CIFS/9000 can only run batch files from Windows 95(J) clients if the file or directory names are specified in the 8.3 format. This is not a Japanese specific problem but an MS-DOS limitation.

  For example, the following batch files cannot run.

  ```
  g:\a1234567890est.bat
  ```

  ```
  g:\a123456est567890.bat
  ```

  There is no workaround.

For configuration examples, refer to “Step 4, Modifying the Configuration in this chapter.”

3 Managing HP-UX File Access Permissions from Windows NT/XP/2000

Introduction

This chapter describes how to use Windows NT, XP and 2000 clients to view and change standard UNIX file permissions and VxFS POSIX Access Control Lists (ACL) on a CIFS/9000 server. A new configuration option, acl_schemes, is also introduced.

UNIX File Permissions and POSIX ACLs

The CIFS/9000 Server enables the manipulation of UNIX file permissions or VxFS POSIX ACLs from Windows NT, XP or Windows 2000 clients. With this capability most management of UNIX file permissions or POSIX ACLs can be done from the familiar Windows Explorer interface.

NOTE

Although concepts of file ACLs are similar across the Windows and HP-UX platforms, there are sufficient differences in functionality that one cannot substitute UNIX ACLs for Windows ACLs (i.e. full emulation is not provided). For example, a Windows application that changes the ACL data of a file may behave unexpectedly if that file resides on a CIFS/9000 Server.

Viewing UNIX Permissions From Windows NT

As a result of the ACL data differences in NT and UNIX file permissions and VxFS POSIX, Samba must map data from UNIX to NT and NT to UNIX.

The table below shows how UNIX file permissions translate to Windows NT ACL access types:

Table 3-1

UNIX Permission	NT access type
r--	Special Access(R)
-w-	Special Access(W)
--x	Special Access(X)
rw-	Special Access(RW)
r-x	Read(RX)
-wx	Special Access(WX)

Table 3-1 (Continued)

UNIX Permission	NT access type
rwx	Special Access(RWX)
r--	Special Access

In addition to the permission modes shown above, UNIX file permissions also distinguish between the file owner, the owning group of the file, and other (all other users and group).

UNIX File Owner Translation in NT ACL

A UNIX file system owner has additional permissions that others users do not have. For example, the owner can give away his ownership of the file, delete the file, rename the file, or change the permission mode on the file. These capabilities are similar to the delete (D), change permissions (P) and take ownership (O) permissions on the Windows NT client. Samba adds the *DPO* permissions to represent UNIX file ownership in the Windows NT explorer interface.

For example, if a file on the UNIX file system is owned by UNIX user *john* and *john* has read and write (rw-) permissions on that file, the Windows NT client will display the same permissions for user *john* as:

Special Access(RWDPO)

You can also display the UNIX owner in the Windows NT Explorer interface. If you are in the *File Properties* dialog box with the Security tab selected and you press the *Ownership button*, the owning UNIX user's name will be displayed.

UNIX Owning Group Translation in NT ACL

The *owning group* on a UNIX file system is represented on the Windows NT client with the *take ownership* (O) permission. While the meaning of the *take ownership* permission on NT doesn't exactly match the meaning of an owning group on the UNIX file system, this permission is still translated into the *take* ownership permission.

This representation becomes even more significant when translating VxFS POSIX ACLs, as there can be many groups with different permissions on an individual file in this file system. Without this permission type, you would not be able to tell the owning group entry from other group entries.

For example, if an owning group named *sales* on the UNIX file system has *read* and *execute* (r-x) permissions on a file, the Windows NT client will display the permissions for group *sales* as:

Special Access(RXO)

UNIX Other Permission Translation in NT ACL

In UNIX, the other permission entry represents permissions for any user or group that is not the *owner*, and doesn't belong to the *owning group*. This entry maps to the *everyone* access control entry on the Windows NT client.

NT Directory and File Permission Translations

Windows NT clients display two sets of permissions for directory entries: *directory* permissions and *file* permissions. Directory Permissions are the permissions for the directory itself. File Permissions are the permissions inherited by the files and subdirectories created in the directory. Samba translates UNIX permissions for a directory into Windows NT directory permissions and vice versa. Windows NT *file permissions* are not supported when the translation is to/from UNIX permissions.

NT *file permissions*, however, are supported with VxFS POSIX ACLs (as described in the next section).

Setting UNIX Permissions from Windows NT

With one exception, reversing the UNIX to NT translations described above will always work. You cannot, however, change the *owner* or *owning group* by adding *Special Access(DPO)* or *Special Access(O*) to a user or group from the client.

All NT permissions, except read, write and execute, are disregarded when applied to files on the Samba server. These include delete (D), change permissions (P) and take ownership (O).

The table below shows how NT access types map to UNIX permissions:

Table 3-2

NT access type	UNIX Permission
Special Access(R)	r--
Special Access(W)	-w-
Special Access(X)	--x

Table 3-2 (Continued)

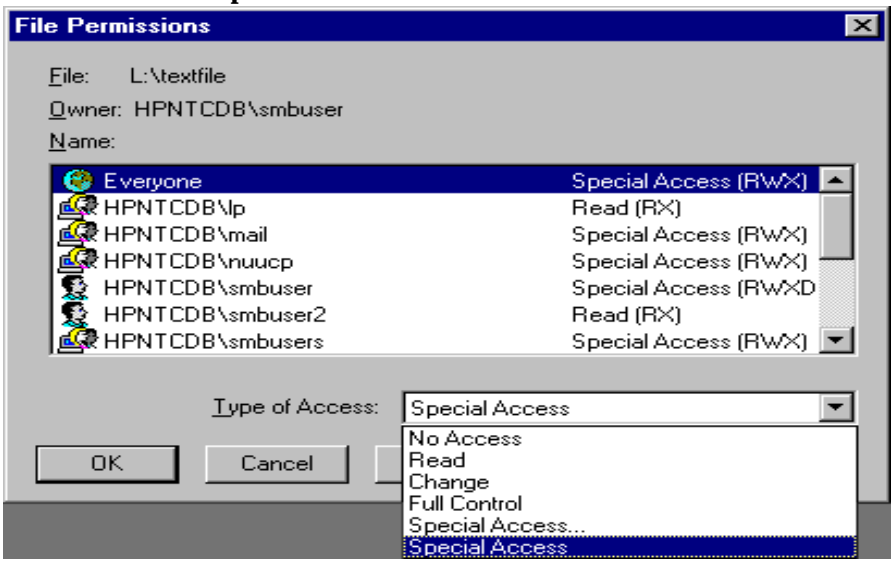
NT access type	UNIX Permission
Special Access(RW)	rw-
Read(RX)	r-x
Special Access(WX)	-wx
Special Access(RWX)	rwx
Special Access	r--

When mapping to UNIX file permissions from NT, you will not be able to add new NT ACL entries because only the *owner*, *owning group* and *other* ACL entries are supported by UNIX permissions. UNIX ignores unrecognized entries. Conversely, you cannot delete any of the three entries listed above as these entries are required by UNIX.

Pre-defined NT Permissions

The Windows NT Explorer ACL interface allows you to choose predefined permissions like *Change* and *Full Control* in addition to creating custom Special Access permissions.

Figure 3-1 **Windows NT Explorer ACL Interface**



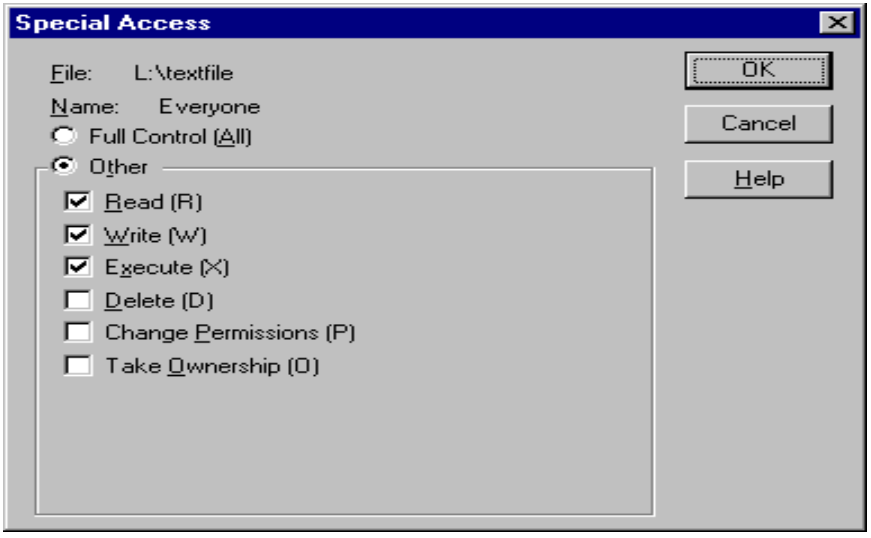
If you use pre-defined NT access types to set permissions on a Samba share, the permissions that are displayed later will not match what you set in NT.

For example, *Full Control* will become *rwx* on the Samba server, and when it is displayed on the Windows NT client, it will show up as *Special Access (RWX)*.

Table 3-3

NT Access Type	UNIX Permission
No Access	---
Read	r-x
Change	rwx
Full Control	rwx

Figure 3-2 Windows NT Special Access Permissions



The VxFS POSIX ACL File Permissions

VxFS POSIX ACLs are a superset of UNIX file permissions. VxFS POSIX ACLs extend the concept of UNIX file permissions in three ways.

- VxFS POSIX ACLs allow for more entries than the basic owner, group and other UNIX file permissions.
- VxFS POSIX ACLs support default Access Control Entry (ACE) for directory permissions. This means that any files created in that directory will automatically inherit the default ACEs of the parent directory. It adds an inheritance permission type to directory permissions.
- A special ACE called the *class* ACE is used. The role of the class *ACE* is to limit the other ACEs. The base UNIX permissions are not affected.

  For example, if the *class ACE* for a file is set to read (*r*--), then even when ACEs grant some users and groups *write* and *execute* access, *write* and *execute* access will not be given to them. The *class ACE* acts

as a mask that filters out the permissions of non-class ACEs. If the *class ACE* was set to (---) or no access, other ACEs might exist, but they would not change the effective permissions.

IMPORTANT

VxFS POSIX ACL file permissions only work when JFS 3.3 or disk layout version4 is installed on your system.

Learn how to install JFS 3.3 on HP-UX 11.0 in the *HP JFS 3.3 and HP OnLineJFS 3.3 Release Notes* (MPN B3929-90007) located at www.docs.hp.com.

Learn about installing and upgrading disk layout versions in the *HP JFS 3.3 and HPOnLineJFS 3.3 VERITAS File System 3.3 System Administrator's Guide* (MPN B3929-90011) located at www.docs.hp.com.

VxFS POSIX ACLs translated to NT ACLs

The extra features of VxFS POSIX ACLs affect the translations to and from NT ACLs in the following ways:

- The extra *VxFS POSIX ACEs* show up as *NT ACEs* on the Windows NT client. The permission mode translates like a UNIX permission mode. With this feature you can also add new user and group entries from the Windows NT client. The limitations to this feature will be discussed in the next section.
- The *default ACE*s that are supported for inheritance by directories are translated into *file permissions* for a directory on NT. The file permissions displayed on the Windows NT client represent the *default ACEs* on the UNIX file system of the Samba server. If the file permissions are set on a directory on the NT client, equivalent *default ACEs* are set on the directory on the UNIX file system.
- The *class ACE* used to limit the other ACEs is ignored. It is not displayed on the Windows NT client and there is no way to set it from the NT client. It would be difficult to support on the client side, as Windows NT has nothing similar to a *class ACE*.

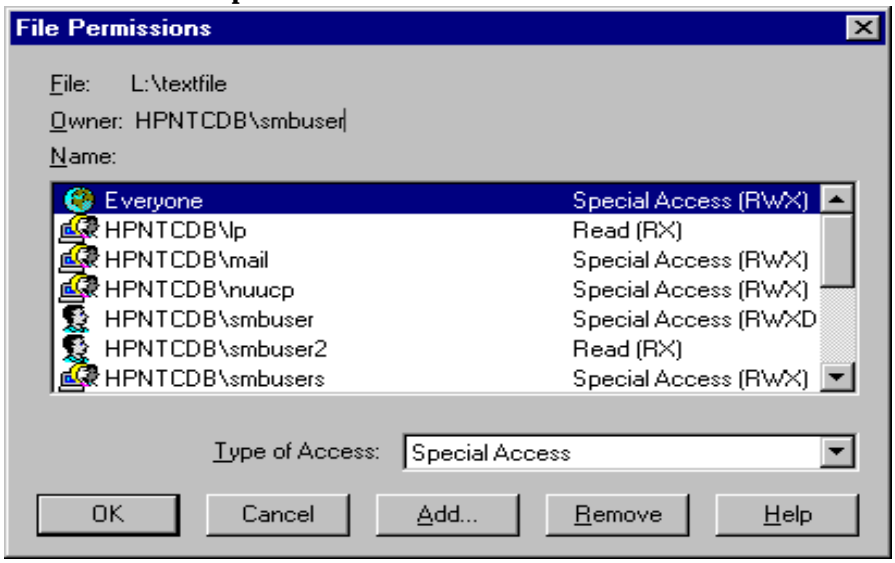
Using the NT Explorer GUI to Create ACLs

Use the Windows NT Explorer GUI to set new ACLs.

This section describes how to add new entries to the ACE list:

- Click the add button in the File/Directory Permissions dialog box of the Windows NT GUI to bring up the Add Users and Groups dialog box.

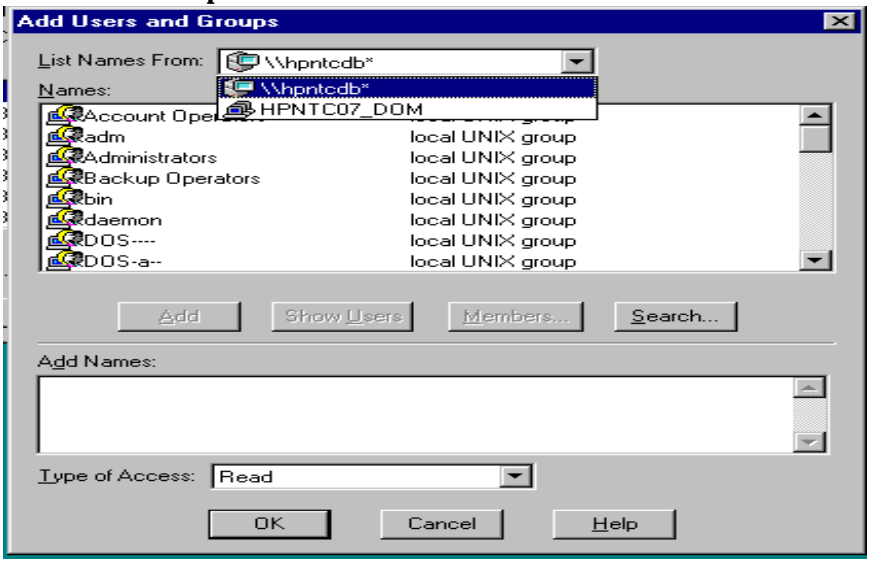
Figure 3-3 Windows NT Explorer File Permissions



NOTE

The *List Names From* field displays the source of the list of group names. It may also show the name of your domain. Do not use the domain list to add new ACLs.

Figure 3-4 Windows NT Explorer List Names From Field

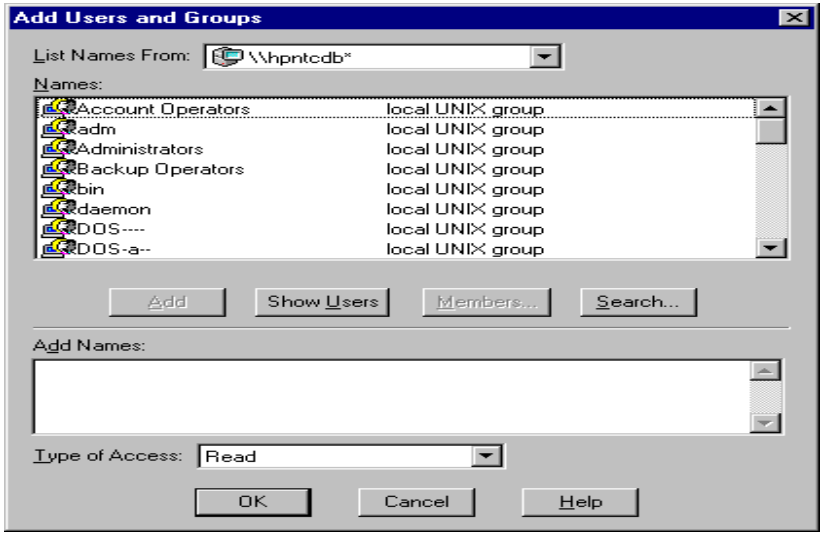


Instead, what you need is a list of groups and users that can be recognized by the underlying UNIX file system.

Since the actual ACLs will be UNIX file permissions or VxFS POSIX ACLs in their final form, the only valid groups and users are UNIX groups and users that the Samba server knows about.

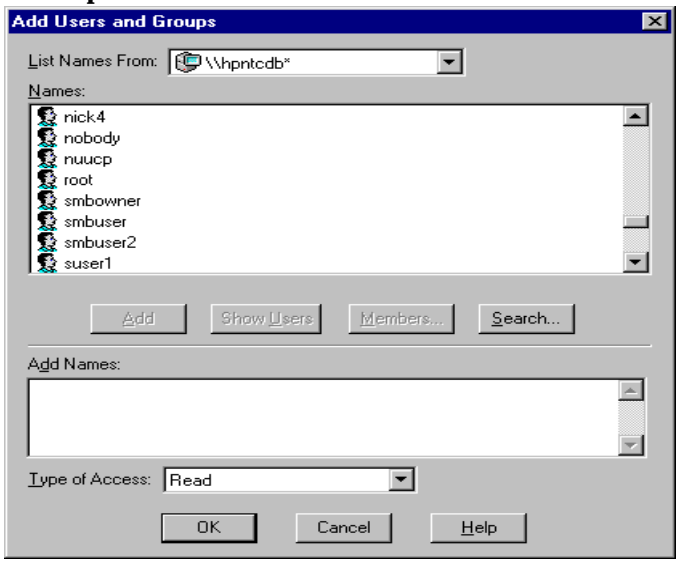
- Go to the *List Names From* dropdown list in the *Add Users and Groups* dialog box. One screen choice is to list names on your Samba server. This is the list HP recommends.

Figure 3-5 Windows NT Explorer Add Users and Groups Dialog Box



- Select any name on the list that is labelled *local UNIX group*. Those groups are actually UNIX groups on the Samba server.
- Optionally, click the *Show Users* button and all the UNIX users on the Samba server will be added to the list as well. You will always be able to add an ACE for the *local Unix groups* and the users in this list.

Figure 3-6 Add UNIX Groups and Users



- You can type user and group names into the *Add Names* text field to add users and groups. If the names are valid UNIX group or user names, the users and groups will be added.
- Optionally, add the Samba server name and a backslash to the beginning of the user or group name and it will be added (for example, *server1\users1*). When you select names off the name list, the GUI will put that name in the text list and automatically add the server name as well.
- Optionally use the user name mapping feature to define a mapping of NT user names (or domain names) to UNIX user names. For example, you could map the NT user names administrator and admin to the UNIX user name *root*. The mapping can be either one-to-one or many-to-one.

  Samba supports the creation of ACEs with NT user names that are mapped to UNIX user names.

  To continue the example above, you could create an ACE for the *administrator* user on the NT client and, on the Samba server, the ACE would be created for the *root* user. The client will display the corresponding ACE as being for the *root* user, not the *administrator* user.

If you add an ACE for one user name, like *administrator* and then display the list of ACEs and see a new ACE for a different user name (root), it maybe confusing. As many NT user names can be mapped to one UNIX user name, Samba only displays the one UNIX user name. It cannot display the NT name that was mapped to the UNIX user name.

You also have to be careful not to create multiple conflicting ACEs for one UNIX user. For example, in the NT GUI you might add an ACE for the user *administrator*, *admin* and *root*. But when you apply these changes, Samba maps *administrator* and *admin* to the UNIX user *root* and the result is that Samba tries to add three different ACEs, all for the user *root*, to one file. That is not valid and Samba ignores two of the three ACEs.

Selecting Names From the Samba Name List

The NT user names mapped to UNIX users will also be displayed when you press the *Show Users* button in the *Add Users and Groups* dialog box. Every valid name that you add to an ACE is in the name list on the Samba server (after you hit the *Show Users* button). You do not need to type in names or select names from the NT domain list. If, however, you pick a name from the NT domain list and it happens to be a UNIX user name on the Samba server, it will be added. This also applies to names that have a user name mapping in Samba.

There is another reason HP recommends selecting names from the Samba server's list of names instead of typing names in manually. There might be a UNIX group and a UNIX user with the same name. If you select a name from the list, Samba knows whether you mean the user or the group. If you type the name in, there is no way for you to specify the user or the group and Samba may add the ACE for a user when you meant the UNIX group with the same name.

POSIX ACLs and Windows 2000 Clients

The CIFS/9000 Server A.01.07, and subsequent versions, allow Windows 2000 clients to view and set POSIX ACL permissions. The information in this section assumes you are familiar with Windows 2000 permissions. The purpose of this section is to explain how the CIFS/9000 Server interprets Windows 2000 permissions, and how Windows 2000 clients interpret and display HP-UX permissions.

Windows 2000 clients interact with POSIX ACLs similar to Windows NT clients, except for the minor differences covered in the following sections. Learn more about ACLs and Windows 2000 clients in the previous sections in this chapter. You can also learn more about POSIX ACLs with `man aclv`.

Viewing Windows 2000 Client Permissions from the CIFS/9000 Server

The following table shows how the CIFS/9000 Server displays permissions set by Windows 2000 clients:

Table 3-4 CIFS/9000 Displays Windows 2000 Client Permissions

CIFS/9000	Windows 2000
r--	Read
-w-	Write
--x	Traverse Folder or Execute (*Advanced*)
rw-	Read, Write
r-x	Read and Execute
-wx	All Write and Execute Attributes (*Advanced*)
rwx	Read, Write, Read and Execute, Modify
---	None (*Advanced*)

NOTE In the table above, the permissions labeled *Advanced* can be viewed from the ACL dialog box by clicking on Advanced, then View/Edit.

Setting Windows 2000 Client Permissions

The following table shows each Windows 2000 client permission and what each permission means to the CIFS/9000 Server:

Table 3-5 CIFS/9000 Server Interpretations of Windows 2000 Permissions

Windows 2000	CIFS/9000
Full Control	rwx
Write	-w-
Modify	rwx
Read and Execute	r-x
Read	r--
List Folder / Read Data (*Advanced*)	r--
Read Attributes (*Advanced*)	r--
Read Extended Attributes (*Advanced*)	r--
Read Permissions (*Advanced*)	r--
Create Files / Write Data (*Advanced*)	-w-
Create Folder / Append Data (*Advanced*)	-w-
Write Attributes *(Advanced)*	-w-
Write Extended Attributes *(Advanced)*	-w-
Traverse Folder / Execute File (*Advanced*)	--x
Delete Subfolders and Files (*Advanced*)	No meaning on HP-UX

Table 3-5 CIFS/9000 Server Interpretations of Windows 2000 Permissions

Windows 2000	CIFS/9000
Delete (*Advanced*)	* see explanation following table
Change Permissions (*Advanced*)	* see explanation following table
Take Ownership (*Advanced*)	* see explanation following table

* The Delete, Change Permissions, and Take Ownership permissions represent file and group ownership. On a user ACE, the user owns the file if Delete, Change Permissions, and Take Ownership permissions are set. On a group ACE, the group owns the file if the Take Ownership permission is set.

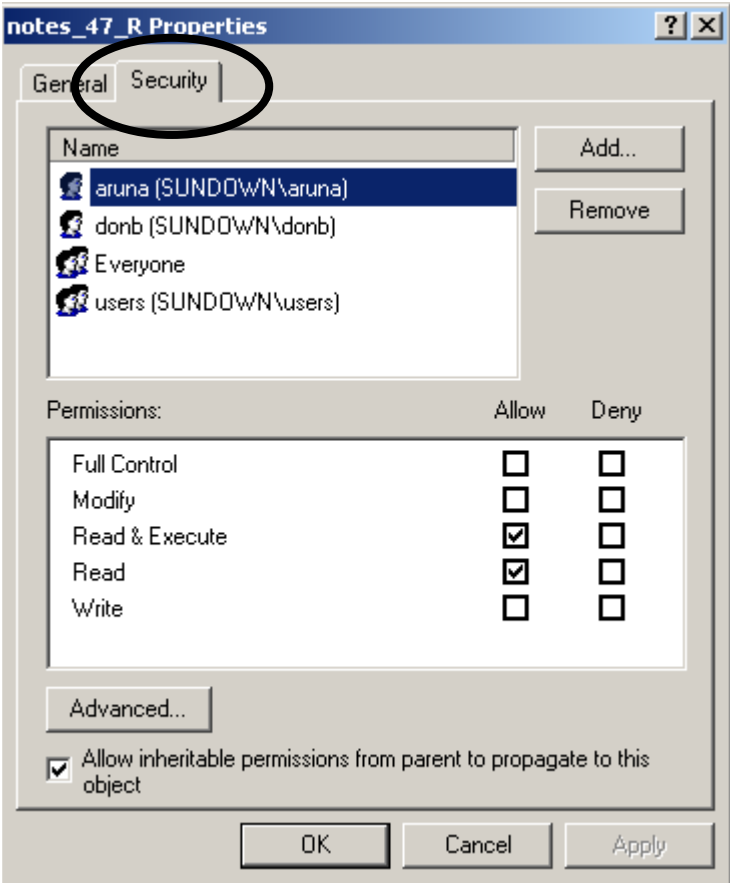
NOTE The Windows 2000 permissions labeled *Advanced* in the table above can be viewed from the ACL dialog box by clicking on Advanced, then View/Edit.

NOTE The CIFS Server ensures that at least “read” permission is set for the file owner. For example, if a user tries to set a file’s permissions to “- - -”, the CIFS Server will actually set it to “r - -”.

Viewing ACLs from Windows 2000 Clients

Step 1. Right-click on a file and select Properties

Step 2. Click on the Security tab



Displaying the Owner of a File

Step 1. Click on Advanced

Step 2. Click on the Owner tab on the Access Control Settings dialog box

Configuring Samba ACL Support

For CIFS/9000 Version A.01.07

In non-HP Samba versions, you could only turn Samba's *NT ACL Support* on or off on a serverwide basis. When turned on, UNIX file permission support was enabled for all Samba shares. There was no support for any ACL scheme, including VxFS POSIX ACLs. Instead, you configured the old *NT ACL support* through the *smb.conf variable nt acl support*. This functionality is still supported in the CIFS/9000 product.

In CIFS/9000, however, there is a new *smb.conf* variable that you can use to configure Samba ACL support. And, with this Samba version, you may configure every share on the Samba server differently.

Since there may be many UNIX file systems under the root of a Samba share, one Samba share may have files on HFS file systems, VxFS 3.3 file systems, NFS file systems, and older VxFS file systems. If you assign one type of ACL support for the share, you might not be taking full advantage of the capabilities of each file system located there. So with this version of Samba you can create a list of ACL schemes for each share.

The list of ACL schemes specifies the order that ACL schemes will be attempted on a file in that share. Currently the ACL scheme *unix* is supported (meaning UNIX file permissions) and *hpux_posix* is supported (meaning VxFS POSIX ACLs on HP-UX).

In the examples below, assume that HP-UX HFS ACLs are also supported and that this scheme is called *hpux_hfs*. The name of the per-share variable in the *smb.conf* is *acl_schemes*.

Examples:

Following are five examples of ACL schemes.

Example 1:

acl schemes = hpux_posix hpux_hfs unix

If a share has this acl schemes parameter set, Samba will attempt to use VxFS POSIX ACLs. If that scheme is not supported, it trys HFS ACLs. And, if that scheme is not supported, it would use UNIX file permissions.

If a Windows client makes a request to see the ACL for a file on an HFS file system in that share, Samba attempts to use the POSIX ACL system call. It will fail and return an error indicating that the ACL scheme is not supported on that file. Then Samba would try the HFS ACL system call and it would succeed. The user would not see the initial failure described in this example.

Example 2:

acl schemes = unix

This is the default ACL scheme. The default ignores UNIX ACL capabilities and uses UNIX file permissions, as was the case with previous versions of Samba.

Example 3:

acl schemes = none

This ACL example turns off all ACL support for the share and causes an error to be returned whenever a client tries to get or to set ACL information on any file system on the share.

Example 4:

acl schemes = hpux_posix

This ACL example supports only VxFS POSIX ACLs on the entire share. For files on NFS, HFS or VxFS pre 3.3 file systems, all attempts from the client to get or to set ACLs will fail. This example will not fall back to the UNIX file permissions. ACL support will only work for files on file systems supporting POSIX ACLs (currently VxFS 3.3 or higher).

Example 5:

acl schemes = unix hpux_posix

This ACL example is the same as setting acl scheme to unix (Example 2) because UNIX file permissions are supported on every UNIX file system type. This means the scheme will never fall through to the next ACL scheme in the list. The unix scheme will be the first and last scheme attempted in each case.

The examples described above show how any combination of ACL schemes can be supported on a Samba share.

If you plan to have many schemes in the ACL scheme list, you will want to setup the best order to maximize efficiency. For example, if the files accessed the most are all on a VxFS 3.3 file system, put *hpux_posix* first

on the ACL scheme list for that share. Otherwise, Samba will make many system calls for other ACL schemes before it locates the right one. This prioritization will become even more important in the future when Samba supports more and more ACL types.

For CIFS/9000 Version A.01.08

With CIFS/9000 Server version A.01.08, the “nt acl support” configuration variable is made share level. It was previously a Global level variable. Its default value is “yes”. Using this variable, users can now control the ACL support on a per-share basis.

Except for setting the above variable, there is no other special configuration needed for supporting ACLs.

For a share supporting NT ACLs, the CIFS Server always tries to get, or set, POSIX ACLs on the Unix file system. If the underlying file system does not support POSIX ACLs, then the CIFS Server will use the Unix file permissions. In such a case, the user will only be able to set or get the three default ACEs (owner, group and everyone). Additional ACEs will be ignored.

With version A.01.08 of the CIFS Server, the configuration variable “acl schemes” (exists in version A.01.07, and below) is *not* supported. However, having this variable in the configuration file will not hurt CIFS Server operation.

The user is advised to remove or comment out occurrences of these variables from the configuration file (*smb.conf*) to prevent confusion.

IMPORTANT

VxFS POSIX ACL file permissions only work when JFS 3.3 or disk layout version4 is installed on your system. Learn how to install JFS 3.3 on HP-UX 11.0 in the *HP JFS 3.3 and HP OnLineJFS 3.3 Release Notes* (MPN B3929-90007) located at www.docs.hp.com. Learn about installing and upgrading disk layout versions in the *HP JFS 3.3 and HPOnLineJFS 3.3 VERITAS File System 3.3 System Administrator's Guide* (MPN B3929-90011) located at www.docs.hp.com.

In Conclusion

Samba ACL support is a feature that enables the manipulation of UNIX file permissions or UNIX ACLs from Windows NT clients.

With this feature, almost any modification you want to make to UNIX permissions or VxFS POSIX ACLs can now be done from an NT client (with the exception of the *class* entry for VxFS POSIX ACLs).

Windows applications running on the Windows NT client cannot expect full NT ACL support. Although much of the NT ACL information is retained and retrieved by the Samba server, some of the information may be lost or changed in some cases.

The ACL support is not an NT ACL emulation, but rather access to UNIX ACLs through the NT client. Therefore you cannot run Windows applications which require full, perfect NT ACL support.

4 Primary Domain Controller (PDC) Support

Introduction

This chapter describes how to set up, and configure, a CIFS/9000 Server as a Primary Domain Controller (PDC).

The following are a list of recent enhancements for the CIFS/9000 Server. Those that are new for version A.01.08 have been identified as such.

- Continue the support for joining a Samba server to the Windows NT domain as a member server
- New for A.01.08: provide the ability to act as a Primary Domain Controller (PDC) for Windows clients which include Windows 95, 98, NT, XP and 2000
- New for A.01.08: provide Domain login feature for Windows NT 4.0 SP3+, XP and 2000 member servers and Samba member servers
- New for A.01.08: support mapping for Windows built-in group and username to a Unix group
- New for A.01.08: support Windows NT logon scripts
- New for A.01.08: view resources on a Samba PDC using Microsoft's "Server manager for Domain" tool
- New for A.01.08: support local and roaming profiles
- New for A.01.08: support the specified logon home share to a Samba server

NOTE Version A.01.08 of the SIFS/9000 Server does not support Security Accounts Manager (SAM) databases (containing NT user account information) nor does it provide any Backup Domain Controller (BDC) features, and will not support BDCs in a domain for which it is serving as a PDC.

Advantages of the Domain Model

The Windows NT domain model provides a number of advantages:

- Windows NT administrators may group workstations and servers under the authority of a domain controller
- Domain members may be centrally administered by using domains to group related machines. One of the benefits of this is the ability for user accounts to be common for multiple systems. A user may now make one password change which will affect multiple systems accessed by that user. Another benefit is that IT administration work is reduced, since there is no longer a need for individual accounts to be administered on each system

Primary Domain Controllers

The Primary Domain Controller (PDC) is responsible for several tasks within the domain. These include:

- Authenticating user logons for users and workstations that are members of the domain
- Acting as a centralized point for managing user account and group information for the domain
- A user logged on to the Primary Domain Controller (PDC) as the domain administrator can add, remove or modify Windows domain account information on any machine that is part of the domain
- It should be noted that the current version of the PDC does not support having a BDC in the domain. Because of this, if the PDC fails, there is no way for Windows Client users of the domain to be authenticated. And, if a disk fails on the PDC, there is no backup on the domain with the critical credential data. This means that it is very important to make backups of users credential files. It also means that there is no system that can be easily promoted to a PDC to take the place of the existing PDC

Domain Members

- The following member servers are supported:
  - Windows NT
  - Windows 2000
  - Windows XP
  - CIFS/9000

— AS/U

- Users on a domain member machine can access network resources within the domain. Some examples of these resources are file and printer shares and application servers
- Domain members do not perform the user authentication for user logons. Instead, the member sends the credentials to a domain controller via a secure channel. The domain controller checks the credentials against those in its database and returns the results to the member server. Access is granted based on the results returned

Create the Machine Trust Accounts

Creating the Machine Trust Accounts for a Windows Client (Client = member server) on a CIFS/9000 Server acting as a PDC means:

- Creating machine accounts in the file named */etc/passwd*
- Creating the machine accounts entries in the file named */var/opt/samba/private/smbpasswd*

The following steps are used to create a machine account for a Windows Client on a CIFS/9000 Server acting as a Primary Domain Controller (PDC).

1. On the Samba PDC Server, use the following command(s) to create a new group called “machines”. This group should be created in the */etc/group* file.

   ```
   groupadd machines
   ```

2. Create the machine trust account for a Windows Client in the */etc/passwd* file, using the following command:

   ```
   useradd -g machines -c NT_workstation -d /home/temp -s
   /bin/false client1$
   ```

   The resulting entry for a client machine named “CLIENT1” would be:

   ```
   client1$:*.801:800:NT Workstation
   1:/home/temp:/bin/false
   ```

   where `801` is a uid and `800` is the group id of a group called “machines.” A uid or group id can be any unique number. You may find that uid values 0 through 100 are considered special, and/or server specific. This may, or may not apply to your system.

   The machine account is the machine’s name with a dollar sign character (“$”) appended to it. The home directory can be set to `/home/temp`. The shell field in the */etc/passwd* file is not used and can be set to `/bin/false`.

3. On the Samba PDC server, run the “smbpasswd” program to add a machine entry for a Windows client to the */var/opt/samba/private/smbpasswd* file. Example:

```
smbpasswd -a -m client1
```

In this example, the "`client1`" is the machine name of a Windows Client.

Configure Domain Users

The following examples show the commands used to configure Domain Users, Domain Administrators and Domain Guests on a CIFS/9000 Server configured as a PDC.

- If you are a root-level user, create a Domain User in the group named “users”, located in the */sbin/sh* directory. For example:

  ```
  useradd -g users -c “Domain Users” -s /sbin/sh domuser
  ```

  If you are *not* a root-level user, create a Domain User in the group named “users”, located in the */usr/bin/sh* directory. For example:

  ```
  useradd -g users -c “Domain Users” -s /usr/bin/sh domuser
  ```

  where `domuser` is the name of a Domain User.

- If you are a root-level user, create a Domain Administrator in the group named “adm”, located in the /sbin/sh directory. For example:

  ```
  useradd -g adm -c “Domain Administrators” -s /sbin/sh domadmin
  ```

  If you are *not* a root-level user, create a Domain Administrator in the group named “adm”, located in the */usr/bin/sh* directory. For example:

  ```
  useradd -g adm -c “Domain Administrators” -s /usr/bin/sh domadmin
  ```

  where `domadmin` is the name of a Domain Administrator.

- If you are a root-level user, create a Domain Guest in a group named “users”, located in the */sbin/sh* directory. For example:

  ```
  useradd -g users -c “Domain Guest” -s /sbin/sh domguest
  ```

  If you are *not* a root-level user, create a Domain Guest in a group named “users”, located in the */usr/bin/sh* directory. For example:

  ```
  useradd -g users -c “Domain Guest” -s /usr/bin/sh domguest
  ```

  where `domguest` is the name of a Domain Guest.

Be sure that all of the users that were created (see the example above) have been added to the */etc/passwd* file.

Configure the CIFS/9000 Server as a PDC

When configured to act as a Primary Domain Controller (PDC), the CIFS/9000 Server should create machine accounts for Windows Clients (member servers). To enable this feature, choose "Primary Domain Controller" when executing `samba_setup`, then verify the following:

1. The *smb.conf* file is as shown:

```
[global]
  workgroup = SAMBADOM #Samba Domain
  security = user
  domain logon = yes
  domain master = yes
  encrypt passwords = yes

[netlogon]
  comment = The domain logon service
  path = /var/opt/samba/netlogon
  writeable = no
  guest ok = no
```

2. */var/opt/samba/netlogon* subdirectory for the domain logon service exists.

NOTE

`domain logons`: This parameter must be set to "yes" in order for the CIFS/9000 Server to act as a PDC.

`Encrypt passwords`: If this parameter is set to "yes", the passwords used to authenticate users will be encrypted. This parameter must be set to "yes" when a CIFS/9000 Server is configured to act as a PDC.

Configuration Options

The configurations shown in this section are not required for the basic PDC functionality.

Map an NT Domain Admin Group to a Unix Group

A Samba Server can be configured as a PDC to map a Windows NT domain admin group to the Unix group.

Modify the *smb.conf* file to set the global parameter named `domain admin group` to point to the Unix admin group and user. Example:

```
[global]
  domain admin group = root @adm
```

In this example, a group called “adm” should be created by the user in the */etc/group* file.

Map an NT Domain Guest Group to a Unix Group

A Samba Server can be configured as a PDC to map a Windows NT domain guest group to the Unix group.

Modify the *smb.conf* file to set the global parameter named `domain guest group` to point to the Unix guest built-in group and user. Example:

```
[global]
  domain guest group = guest @guest
```

In this example, a group called “guest” should be created by the user in the /etc/group file.

Join a Windows Client to a Samba Domain

1. Verify the following parameters in the *smb.conf* file:

   Set the `security` parameter to "user."

   Set the `workgroup` parameter to the name of the domain.

   Set the `encrypt passwords` parameter to "yes."

   ```
   [global]
     security = user
     workgroup = SAMBADOM #SAMBA Domain name
     domain logon = yes
     encrypt passwords = yes
   ```

2. On the Samba PDC Server, create a machine trust account for a Windows Client in the */etc/passwd* file, using the following command:

   ```
   useradd -g machines -c NT_workstation -d /home/temp -s
   /bin/false client1$
   ```

   An example of the *command* can be seen within the *upper* dark rectangle in Figure 4-1, below.

   The resulting entry for a client machine named "CLIENT1" would be:

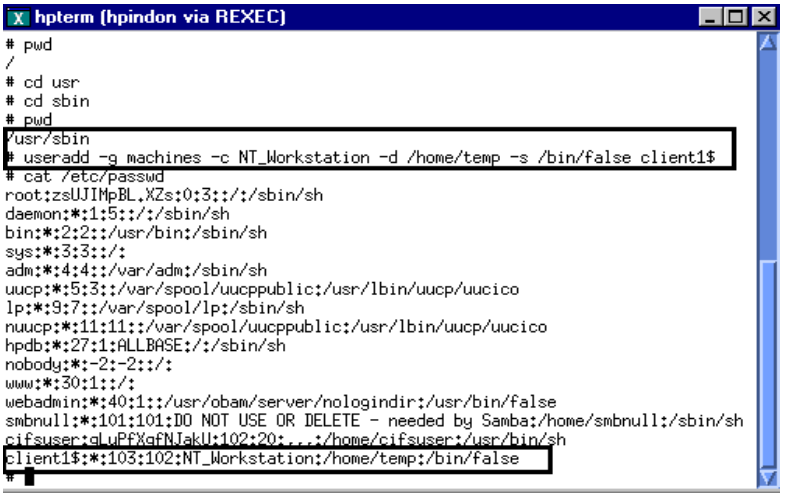
   ```
   client1$:*.801:800:NT Workstation
   1:/home/temp:/bin/false
   ```

   where `801` is a uid and `800` is the group id of a group called "machines." A uid or group id can be any unique number. You may find that uid values 0 through 100 are considered special, and/or server specific. This may, or may not apply to your system.

   The machine account is the machine's name with a dollar sign character ("$") appended to it. The home directory can be set to `/home/temp`. The shell field in the */etc/passwd* file is not used and can be set to `/bin/false`.

   An example of the *entry* can be seen within the *lower* dark rectangle in Figure 4-1, below.

Figure 4-1 Create A Machine Trust Account



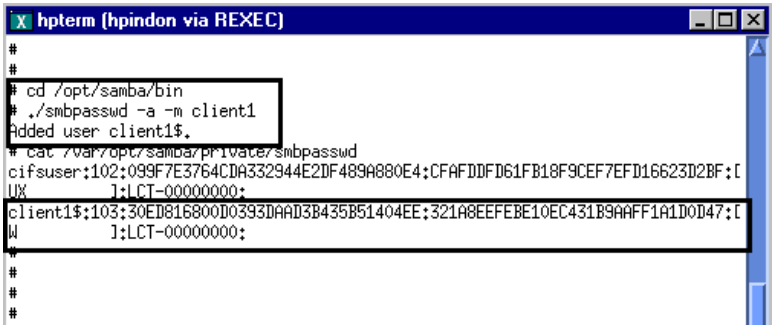
3. Run the `smbpasswd` program to add a machine entry for a Windows Client to the */var/opt/samba/private/smbpasswd* file using the following command:

   `smbpasswd -a -m client1`

   An example of this *command* can be seen within the *upper* dark rectangle in Figure 4-2, below, and an example of the associated machine entry can be seen in the *lower* rectangle.

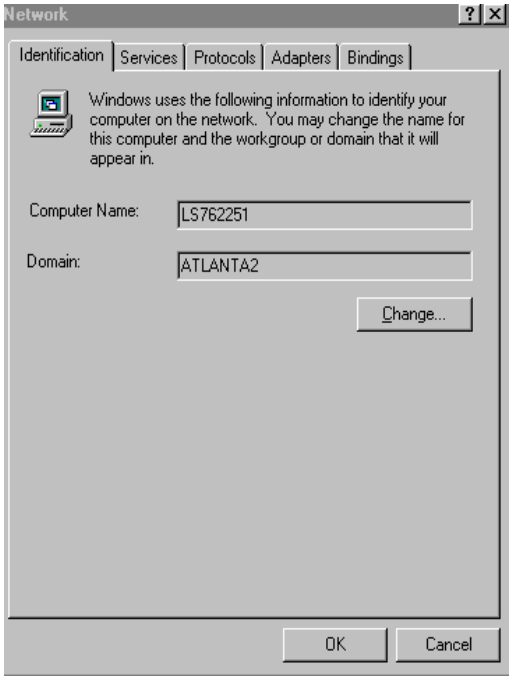
   In this example, the "`client1`" machine entry is the machine name of a Windows Client.

Figure 4-2 Add A Machine Entry



4. Logon to Windows NT as a local admin user.
5. From the Windows NT desktop, click ‘Start’, ‘Settings’ and ‘Control Panel’. When the Control Panel window opens, double-click on the ‘Network’ icon. When the ‘Network’ window opens, click the ‘Identification’ tab. Refer to Figure 4-3 below.
6. Enter the Samba domain name in the ‘Domain’ field, and click on the ‘Change’ button. Refer to Figure 4-3 below.

Figure 4-3 Entering A Samba PDC Domain Name



Roaming Profiles

The CIFS/9000 Server, configured as a PDC, supports Roaming Profiles with the following features:

- A user's environment, preference settings, desktop settings, etc. are stored on the CIFS/9000 Server
- Roaming Profiles can be created as a share, and be shared between Windows clients
- When a user logs on to a workstation in the domain, the roaming profile is downloaded from the share which is on a CIFS/9000 Server configured as a PDC, to the local machine. Upon logout, the profile is copied back to the server

Configuring Roaming Profiles

Use the following procedure to configure roaming profiles:

1. Modify or enable roaming profiles by using the global parameter named `logon path`, in the *smb.conf* file. Example:

```
[global]
  logon path = \\%L\profile\%U
  workgroup = SAMBADOM
  security = user
  encrypt passwords = yes
  domain logon = yes
```

2. Create a `[profiles]` share for roaming profiles. The following is an example configuration for the `[profiles]` share:

```
[profiles]
  path = /var/opt/samba/profiles
  read only = no
  create mode = 600
  directory mode = 770
  writeable = yes
  browseable = no
  guest ok = no
```

Configuring User Logon Scripts

The following is an example configuration for user logon scripts:

```
[global]
  logon script = %U.bat

[netlogon]
  path = /var/opt/samba/netlogon
  writeable = yes
  browseable = no
  guest ok = no
```

In this example, the batch (.bat) file is executed from a file share called [netlogon] on a CIFS/9000 Server configured as a PDC.

Running Logon Scripts When Logging On

A CIFS/9000 Server configured as a PDC can enable the execution of logon scripts when users log on. To enable this feature, the following must be done:

- User logon scripts should be stored in a file share on the CIFS/9000 Server called `[netlogon]`.
- The CIFS/9000 Server enables the execution of login scripts by setting the global parameter named `logon script` in the *smb.conf* file.
- Any logon script that is to be executed on a Windows Client must be in DOS text format and contain *executable* permission.

Home Drive Mapping Support

A CIFS/9000 Server provides user home directories and home drive mapping functionality by using the following two global parameters in the *smb.conf* file:

- `login home`
- `logon drive`

Example:

```
[global]
  logon drive = H:
  logon home = \\%L\%U
```

5 Domain Member Server Support

This chapter describes the process for Joining a CIFS/9000 Server to a Windows NT or Samba Domain.

Join a CIFS/9000 Server to a Windows NT, Windows 2000 or Samba Domain

Step-by-step Procedure

1. Choose “Domain Member Server” when executing `samba_setup`. When prompted, you will need to add your domain Member Server machine account to the PDC.

   For Windows NT: Go to the Windows NT PDC and create a machine account for the CIFS/9000 Member Server by performing the following steps:

   a. Open the “start/programs/administrator/tools/server manager” tool.

   b. Select the “computer/add to domain” icon and enter the host name of the CIFS/9000 Server.

   c. Choose the “Windows NT Workstation or Server” option when you are asked for the computer type.

   For Windows 2000: Go to the Windows 2000 PDC and create a machine account for the CIFS/9000 Member Server by using the Active Directory Controller Wizard.

   The CIFS/9000 Server only supports NTLM security.

   For Samba (including CIFS/9000): Go to the Samba Server acting as a PDC and create a machine account for the CIFS/9000 Member Server by following the steps provided in Chapter 4 section titled, “Create a Machine Trust Account.” *samba_setup* will then perform the following commands for you:

   ```
   smbpasswd -j NTDOM -r DOMPDC
   ```

   The `NTDOM` parameter is the Windows NT domain name.

   The `DOMPDC` parameter is the NetBIOS name of the Windows PDC machine.

2. Verify the following parameters in the *smb.conf* file:

```
[global]
  security = domain
  workgroup = NTDOM #Window NT or Samba Domain name
  password server = DOMPDC
  encrypt passwords = yes
```

NOTE

`workgroup`: This parameter specifies the domain name of which the CIFS/9000 Server is a member.

`security`: When the CIFS/9000 Server joins a domain as a member, this parameter must be set to “domain”.

`password server`: This parameter defines the NetBIOS name of the PDC machine which performs the username authentication and validation.

`encrypt passwords`: If this parameter is set to “yes”, the passwords used to authenticate users will be encrypted.

6 Configuring HA CIFS/9000

CIFS/9000 has two High Availability configurations: Active-Standby and Active-Active.

An “active-standby” High Availability configuration is a configuration where, under normal conditions, one node of the MC/ServiceGuard cluster is running the MC/ServiceGuard package and one or more other nodes are in a “wait” mode, waiting to run the package if anything goes wrong on the first node. Only one node can run the package at any given time. Hence the names in this type of HA configuration are: “active” for the first node and “stand by” for the other node(s).

An “active-active” High Availability configuration is a configuration where, under normal conditions, both (or all) of the MC/ServiceGuard cluster nodes are running similar MC/ServiceGuard packages at the same time. If one of the nodes fails, one of the other nodes has to start doing the work that the failed node had been doing. Both nodes are normally actively working. Neither one is standing by idle, waiting for a failure to occur. In our example, both MC/ServiceGuard cluster nodes normally are running CIFS/9000 Servers.

This chapter includes complete descriptions of both types along with the steps required to configure each one.

Overview of HA CIFS/9000 Server Active-Standby

Highly Available CIFS/9000 Server allows the CIFS/9000 Server product to run on a MC/ServiceGuard cluster of nodes. MC/ServiceGuard allows you to create high availability clusters of HP 9000 Server computers.

You must set up an MC/ServiceGuard cluster before you can set up an HA CIFS/9000 Server. For instructions on setting up an MC/ServiceGuard cluster, refer to the *Managing MC/ServiceGuard* manual.

HA CIFS/9000 Server provides customizable configuration, control scripts and monitor scripts. These scripts as well as a README file reside in the directory */opt/samba/HA/active_standby*. These are sample scripts and should be customized for your environment.

This section and the files in */opt/samba/HA/active_standby* only apply to an active-standby HA configuration. The equivalent files which apply to an active-active HA configuration are in the */opt/samba/HA/active-active* directory.

Recommended Clients

The recommended clients for HA CIFS/9000 Server are Windows 95 and Microsoft NT Workstation. Older clients, such as DOS/Windows 3.1 LM 2.2C and Windows for Workgroups, may not respond well to CIFS/9000 Server stopping and network connections terminating as occurs during an HA CIFS/9000 Server switchover.

Review the “Special Notes for HA CIFS/9000 Server” section contained later in this chapter for usage considerations.

Installing Prerequisites

HA CIFS/9000 Server must be installed and configured on both the primary and alternate cluster nodes.

Before creating a Highly Available CIFS/9000 Server package, however, you must set up your MC/ServiceGuard cluster according to the instructions in the *Managing MC/ServiceGuard* manual.

To do so, perform the following:

1. Following the instructions, configure the disk hardware for high availability.
2. Use SAM or LVM commands to set up volume groups, logical volumes, and file systems needed for the data that must be available to the primary and alternate cluster nodes when failover occurs.

Install the HA CIFS/9000 Server

Follow the steps below to load the HA CIFS/9000 Server software.

1. Install the CIFS/9000 Server using SD on the primary and alternate nodes. If the CIFS/9000 Server is already installed and configured on the primary node, stop it using the */opt/samba/bin/stopsmb* command and skip to Step 3 below.
2. On the primary node:

   Run the */opt/samba/bin/samba_setup* script to configure the installed files. Enter the server name and domain/workgroup name for the HA CIFS/9000 Server at this time.
3. On the alternate nodes:

   Run the */opt/samba/bin/samba_setup* script and configure it with the same authentication level and domain/workgroup as the primary node.

NOTE

For users used to authenticate CIFS clients, make sure that they have the same name, user ID number, primary group and password on all nodes. This is a very important step.

4. Add the following to the [global] section of the */etc/opt/samba/smb.conf* file on both nodes:

   interfaces = XXX.XXX.XXX.XXX 127.0.0.1

   bind interfaces only = yes

   Where “XXX.XXX.XXX.XXX 127.0.0.1” is replaced with the relocatable IP address for the MC ServiceGuard package, not the LANIC IP address associated with the physical LAN card of the system. If your MC ServiceGuard package has more than one relocatable IP address, put the all on this line.

IMPORTANT

This is important to ensure the IP address of the CIFS/9000 server doesn't change when a failover occurs. If the IP address changed on failover, clients might experience problems.

5. Check that the *RUN_SAMBA* parameter in the */etc/rc.config.d/samba file* is set to 0 on all nodes.

Configure a Highly Available CIFS/9000 Server

To configure the HA CIFS/9000 Server product, you must complete the steps below. These steps are described in detail in the following sections.

1. Move data to the CIFS/9000 share volume.
2. Edit the *samba.conf* package configuration file.
3. Edit the *samba.cntl* control script.
4. Create the MC/ServiceGuard Binary Configuration File.

Move Data to the CIFS/9000 Share Volume

To configure the highly available CIFS/9000 Server package, complete the following tasks on the Primary Node of your MC/ServiceGuard cluster:

1. Move all relevant data to the CIFS/9000 Server package shared volume.

   Relevant data, consisting of all directories and files which will be accessed using CIFS/9000 Server, should reside on shared volumes. This data includes any shares created by the user. For example, if the CIFS/9000 Server administrator creates a *TEST=c:/tmp/test* share, then all the data from */tmp/test* should reside on a shared logical volume.

NOTE

HP recommends that you configure your */etc/opt/samba* directory to reside on a shared logical volume. This allows all nodes to share an *smb.conf* file. This simplifies the configuration, but requires that the names of printers shared by Samba and directory paths to the root of Samba shares be identical. While you could keep separate *smb.conf* files on each node, it would be difficult to keep the *smb.conf* file on every node updated each time a change is made.

It would also be difficult to configure and manage a configuration where the names of shared printers and share locations vary from node to node.

NOTE If you plan to use a *username mapping file*, HP recommends that you configure its location under the */etc/opt/samba* directory. This way, when changes are made, all nodes will be updated.

Below is an example of copied data from the required CIFS/9000 Server directories to the logical volumes in the volume group *vgsamba*.

```
mkdir /tmp/share1_copy /tmp/share2_copy /tmp/etc_copy
mount /dev/vgsamba/lvol1 /tmp/share1_copy
mount /dev/vgsamba/lvol2 /tmp/share2_copy
mount /dev/vgsamba/lvol3 /tmp/etc_copy
cp -r /opt/share1/* /tmp/share1_copy
cp -r /home/share2/* /tmp/share2_copy
cp -r /etc/opt/samba/* /tmp/etc_copy
umount  /tmp/share1_copy
umount  /tmp/share2_copy
umount  /tmp/share3_copy
rm -rf /tmp/share1_copy /tmp/share2_copy /tmp/etc_copy
```

2. Create a directory for the CIFS/9000 Server cluster package.

```
mkdir /etc/cmcluster/samba
```

3. Copy the sample scripts *samba.conf*, *samba.cntl* and *samba.mon* from */opt/samba/HA* to */etc/cmcluster/samba* on the primary node. Make all of the scripts writeable.

```
cp /opt/samba/HA/active_standby/samba.*       /etc/cmcluster/samba
chmod 666 samba.conf samba.cntl samba.mon
```

4. Customize the sample scripts for your MC/ServiceGuard configuration. A sample customization of the HA CIFS/9000 Server package configuration, control and monitor scripts is shown below.

5. Ensure that the control (*samba.cntl*) and monitor (*samba.mon*) scripts are executable.

```
chmod 777 samba.cntl samba.mon
```

Edit the *samba.conf* Configuration File

To configure the *samba.conf* configuration file, complete the following tasks on the Primary Node of your MC/ServiceGuard cluster:

1. Set the *PACKAGE_NAME* variable.

```
PACKAGE_NAME  Sambapkg
```

2. Create a *NODE_NAME* variable for each node that will be running the package. The first *NODE_NAME variable* should specify the primary node. All other *NODE_NAME* variables should specify alternate nodes in the order in which they are to be tried.

```
NODE_NAME  node1
NODE_NAME  node2
```

3. Set the *RUN_SCRIPT* and *HALT_SCRIPT* variables to the full path name of the control script.

```
RUN_SCRIPT   /etc/cmcluster/samba/samba.cntl
RUN_SCRIPT_TIMEOUT  NO_TIMEOUT
HALT_SCRIPT  /etc/cmcluster/samba/samba.cntl
HALT_SCRIPT_TIMEOUT NO_TIMEOUT
```

4. Set the *SERVICE_NAME* variable to *samba_mon*.

```
SERVICE_NAME  samba_mon
SERVICE_FAIL_FAST_ENABLED  NO
SERVICE_HALT_TIMEOUT         300
```

5. Set the *SUBNET* variable to the subnet that will be monitored for the package, as in the following example:

```
 SUBNET 15.13.2.0
```

6. The following initialization settings will cause a package failover to occur if there is a node or network failure, even if the CIFS/9000 Server monitor script is not being used.

```
PKG_SWITCHING_ENABLED       YES
NET_SWITCHING_ENABLED         YES
```

7. If the *NODE_FAIL_FAST_ENABLE* variable is set to NO, the node is not brought down when the package goes down.

```
NODE_FAIL_FAST_ENABLED        NO
```

Edit the *samba.cntl* Control Script

To configure the *samba.cntl* Control Script file, you must complete the following tasks:

1. Create a volume group for the CIFS/9000 Server directories:

```
VG[0]=/dev/vgsamba
```

2. Create a separate *LV[n]* and *FS[n]* variable for each volume group and file system that will be mounted on the server, for example:

```
LV[0]=/dev/vgsamba/lvol1;FS[0]=/opt/share1
LV[1]=/dev/vgsamba/lvol2;FS[1]=/home/share2
LV[2]=/dev/vgsamba/lvol3;FS[1]=/etc/opt/samba
```

   Add additional LV variables, if required.

3. Specify the relocatable IP address and the address of the subnet to which the IP address belongs.

```
IP[0]=15.13.171.20
SUBNET[0]=15.13.168.0
```

4. If you want to use the CIFS/9000 Server monitor script, set the *NFS_SERVICE_NAME* variable to the value of the *SERVICE_NAME* variable in the package configuration file *samba.conf*.

```
SERVICE_NAME[0]=samba_mon
SERVICE_CMD[0]=/etc/cmcluster/samba/samba.mon
```

5. Use the following example as a template for *customer_defined_run_cmds* :

```
function customer_defined_run_cmds
{
# ADD customer defined run commands.

   findproc smbd
   if [ "$pid" = "" ]
   then
         findproc nmbd
         if [ "$pid" = "" ]
         then
             /opt/samba/bin/startsmb
         else
             /opt/samba/bin/stopsmb
             /opt/samba/bin/startsmb
         fi
```

```
    else
         findproc nmbd
         if [ "$pid" = "" ]
         then
             /opt/samba/bin/stopsmb
             /opt/samba/bin/startsmb
         fi
    fi

    test_return 51
}
```

6. Use the following as a template for *customer_defined_halt_cmds*:

```
function customer_defined_halt_cmds
{
# ADD customer defined halt commands.
    findproc smbd
    if [ "$pid" = "" ]
    then
        findproc nmbd
        if [ "$pid" = "" ]
        then
            :
        else
            /opt/samba/bin/stopsmb
        fi
    else
        /opt/samba/bin/stopsmb
    fi

    test_return 52
}
```

WARNING **Make sure that all processes/applications that access the file systems mounted by *sambapkg* are shutdown in the *customer_defined_halt_cmds* subroutine. This will allow the filesystems to be unmounted and failed over to the standby node. Package failover may not occur if any of the file systems mounted by the *sambapkg* cannot be unmounted.**

Create the MC/ServiceGuard Binary Configuration File

NOTE In the steps below, the cluster configuration file is assigned the name */etc/cmcluster/cluster.conf*, and the HA CIFS/9000 Server package configuration file is assigned the name */etc/cmcluster/samba/samba.conf*. The actual cluster and HA CIFS/9000 Server package configuration file names on your system may be different.

To configure the MC/Service Guard Binary file, you must complete the following tasks:

1. Use the *cmcheckconf* command to verify the contents of your cluster and package configuration.

```
cmcheckconf -C /etc/cmcluster/cluster.conf \
     -P /etc/cmcluster/samba/samba.conf
```

2. On the alternate node create cluster package directory:

```
mkdir  /etc/cmcluster/ samba
```

And, copy the package scripts from the primary node.

```
rcp primary_node:/etc/cmcluster/samba/*       /etc/cmcluster/samba
```

3. Use the *cmapplyconf* command to copy the binary configuration file to all the nodes in the cluster.

```
cmapplyconf -v -C /etc/cmcluster/cluster.conf \
     -P /etc/cmcluster/samba/samba.conf
```

This command will distribute the updated cluster binary configuration file to all of the nodes in the cluster.

You are ready to start the HA CIFS/9000 Server package on the primary node.

You have completed your configuration of the HA CIFS/9000 Server.

Special Notes for HA CIFS/9000 Server

There are several areas of concern when implementing Samba in the MC/ServiceGuard HA framework. These areas are described below:

- Client Applications

  HA CIFS/9000 Server cannot guarantee that client applications with open files on a CIFS/9000 Server share, or applications launched from CIFS/9000 Server shares, will transparently recover from a switchover. In these instances there may be cases where the application will need to be restarted and the files reopened as a switchover is a logical shutdown and restart of the CIFS/9000 Server.

- File Locks

  File locks are not preserved during failover. File locks are lost and applications are not advised about any lost file locks.

- Print Jobs

  If a failover occurs when a print job is in process, the job may be printed twice or not at all, depending on the job state at the time of the failover.

- Domain Authentication

  If you are using domain level authentication for your Samba server, there are some files in */var/opt/samba/private* that are very important to authentication working properly. HP recommends that you make the */var/opt/samba/private* directory part of a shared logical volume in this case.

- Symbolic Links

  If you have your Samba server configured with *follow symlinks* set to *yes* and *wide links* set to *yes,* the defaults for these parameters, you should be cautious.

  Symbolic links in the shared directory trees may point to files outside of any shared directory. If the symbolic links point to files that are not in logical shared volumes, then, after a failover occurs, the symbolic link may point to a different file or no file. Keeping the targets of all shared symbolic links synchronized with all MC/ServiceGuard nodes at all times could be difficult in this situation.

Easier options would be to set *wide links* to *no* or to be sure that every file or directory that you point to is on a logical shared volume.

- Encrypted Passwords

  If you have your Samba server configured with *encrypt passwords* set to *yes*, then you have to use an *smbpasswd* file. By default, this file is in */var/opt/samba/private*, but you can specify a different path with the *smb passwd file* parameter.

  HP recommends that you locate your *smbpasswd* file on a logical shared volume if you use this file. You can do so by setting *smb passwd file* to a path within a logical shared volume or by making */var/opt/samba/private* part of a logical shared volume.

- Samba as a WINS Server

  If you configure your Samba server to be a WINS server by setting the *wins support* parameter to *yes*, it will store the WINS database the file */var/opt/samba/locks/WINS.DAT*.

  If this file is not on a logical shared volume, when a failover occurs, there will be a short period of time when all the WINS clients update the Samba WINS server with their address. However, if this short period of time to restore the WINS database is not acceptable, you can reduce the period of time to restore the full WINS service.

  To do so, configure */var/opt/samba/locks/WINS.DAT* to be a symbolic link to a WINS.DAT file on a logical shared volume. HP does not recommend putting the entire */var/opt/samba/locks* directory on a logical shared volume, because the locking data may not be correctly interpreted after a failover.

- Samba as a Master Browser

  If you configure your Samba server to be the domain master browser by setting the *domain master* to yes, it will store the browsing database in the */var/opt/samba/locks/BROWSE.DAT* file. HP does not recommend doing this in an HA configuration.

  If you do so, you will probably want to configure */var/opt/samba/locks/BROWSE.DAT* as a symbolic link to a *BROWSE.DAT* file on a logical shared volume. HP does not recommend putting the entire */var/opt/samba/locks* directory on a logical shared volume because the locking data may not be correctly interpreted after a failover.

- Automatic Printer Sharing

If you configure your Samba server with a *[printers]* share to automatically share all the printers on your HP-UX system, then you will need to be certain that all your MC/ServiceGuard nodes have the same HP-UX printers defined. Otherwise, when a failover occurs, the list of shared printers for the Samba server will change resulting in problems on clients using those printers.

- *LMHOSTS* File

  If you wish to use an *LMHOSTS* file to store the static addresses for certain NetBios names, HP recommends that you put the *LMHOSTS* file on a logical shared volume.

  By default the *LMHOSTS* file is in the */etc/opt/samba* directory, which should already be in a logical shared volume, so the *smb.conf* file is shared for all the MC/ServiceGuard nodes. If you specify a different path for the *LMHOSTS* file with the *-H* option when you invoke *nmbd*, HP recommends that you put the *LMHOSTS* file on a logical shared volume so that all the nodes can share it.

Overview of HA CIFS/9000 Server Active-Active

Highly Available CIFS/9000 Server allows the CIFS/9000 Server product to run on a MC/ServiceGuard cluster of nodes. C/ServiceGuard allows you to create high availability clusters of HP 9000 Server computers.

You must set up an MC/ServiceGuard cluster before you can set up an HA CIFS/9000 Server. For instructions on setting up an MC/ServiceGuard cluster, refer to the *Managing MC/ServiceGuard* manual.

The HA CIFS/9000 Server provides customizable configuration, control scripts and monitor scripts. These scripts as well as this README file are in the */opt/samba/HA/active_active* directory. These are sample scripts for you to customize for your environment.

This README and the files in */opt/samba/HA/active_active* only apply to an active-active HA configuration. The equivalent files, which apply to an active-standby HA configuration, are in the */opt/samba/HA/active-standby* directory.

IMPORTANT

This active-active configuration scheme has been revised and now differs from the scheme provided by initial CIFS/9000 Server releases. This scheme allows for any number of cluster nodes. The templates are simpler. This scheme also avoids confusion about netbios name to IP address mapping and registration with WINS servers. This scheme avoids the “ghost” session issues when packages are moved. As with the previous scheme, the SWAT utility has limited capabilities in an HA environment.

Recommended Clients

The recommended clients for the HA CIFS/9000 Server are Windows 9x and Microsoft NT/2000. Older clients, such as DOS/Windows 3.1 LM 2.2C and Windows for Workgroups, may not respond well to the CIFS/9000 Server stopping and to network connections terminating, as occurs during an HA CIFS/9000 Server switchover.

Review the “Special Notes for HA CIFS/9000 Server” section contained later in this section for usage considerations.

Installing Highly Available CIFS/9000 Server

HA CIFS/9000 Servers must be installed and configured on all cluster nodes in the Active-Active configuration. All cluster nodes act as “primary” nodes and, at the same time, as “alternate” nodes for others. If there is no failover, each cluster node runs one of the packages. If a failover occurs, a cluster node will pick up the failed package in addition to its original package.

Before creating a Highly Available CIFS/9000 Server package, you must set up your MC/ServiceGuard cluster according to the instructions in the *Managing MC/ServiceGuard* manual.

To do so, perform the following:

1. Following the instructions, configure the disk hardware for high availability.
2. Use SAM or LVM commands to set up the volume groups, logical volumes, and file systems needed for the data that must be available to the primary and alternate cluster nodes when failover occurs.

HA CIFS/9000 Server Installation

1. Install CIFS/9000 Server using SD on all cluster nodes. If CIFS/9000 Server is already installed and configured on either node, simply stop it with the `/opt/samba/bin/stopsmb` command and skip to step 4.
2. On the first node:

   Run the script */opt/samba/bin/samba_setup* to configure the Samba server. Enter the server name and domain/workgroup name for the HA CIFS/9000 Server.
3. On the secondary nodes:

   Run the script /opt/samba/bin/samba_setup to configure the second node. You will need to specify the same domain/workgroup name specified on the first node. Do not use the same server name.
4. For any UNIX users used to authenticate CIFS clients, check that they have the same name, user ID number, primary group and password on both of the nodes.

This is required for any users used to authenticate to either Samba server in the Active-Active configuration. This means that any user name used on both Samba servers must have the same user ID, primary group ID, and password on both cluster nodes. If this isn't the case, you cannot use Samba as an Active-Active server for this MC/ServiceGuard cluster.

5. Check that the RUN_SAMBA parameter in the /etc/rc.config.d/samba file is set to 0 on both nodes.

Configure a Highly Available CIFS/9000 Server

Introduction

Before configuring the MC/Serviceguard packages, it is important to understand how CIFS/9000 Server is able to support active-active configurations.

The CIFS/9000 Server permits multiple instances of its NetBIOS and SMB master demons.

Each CIFS Server has its own smb.conf file to define its behavior. The NetBIOS name and IP address that the client connects to is used to decide which smb.conf file is used for the connection. This multiple CIFS master demon configuration allows CIFS/9000 to run multiple MC/ServiceGuard packages simultaneously.

When a failover occurs, MC/ServiceGuard transfers the IP address from the failing cluster node to another node. When MC/ServiceGuard moves the package from the failing cluster node to the other node, it activates the appropriate CIFS Server on a remaining node. With the IP address switched, all the traffic that was going to the failed node now goes to the other active node. The key is to have a CIFS Server configured to look and act just like the CIFS Server that was running on the original node.

Load balancing between systems while all systems are up can be achieved by having the CIFS shares accessible only through certain CIFS Server names (NetBIOS names). Keep this in mind when you associate the CIFS shares and directories with logical volumes during server configuration.

Instructions

The following instructions are for one of the MC/ServiceGuard package. You will have to go through these steps for each CIFS server package (one for each node). You will then need to copy all the files to all nodes in your cluster.

When complete, each HPUX system will have a package using the NetBIOS name for each node in the cluster, though only the package with its own NetBIOS name will be active until a failover occurs.

For example, if you have a three node cluster, you will have three packages on each of the three HPUX systems.

There will be three cluster directories:

1. /etc/cmcluster/samba/sambapkg1
2. /etc/cmcluster/samba/sambapkg2
3. /etc/cmcluster/samba/sambapkg3.

There will be three configuration files:

1. /etc/opt/samba/smb.conf.ha_server1,
2. /etc/opt/samba/smb.conf.ha_server2
3. /etc/opt/samba/smb.conf.ha_server3.

There will be three directories:

1. /var/opt/samba/ha_server1
2. /var/opt/samba/ha_server2
3. /var/opt/samba/ha_server3

...where the locks and log files will reside.

Complete the following for each CIFS package of your MC/ServiceGuard cluster:

1. Create the following directories:

   /var/opt/samba/<netbios name>
   /var/opt/samba/<netbios name>
   /locks/var/opt/samba/<netbios name>/logs

   where <*netbios name*> is the name for your CIFS server. For example:

```
$mkdir /var/opt/samba/ha_server1
$mkdir /var/opt/samba/ha_server1/locks
$mkdir /var/opt/samba/ha_server1/logs
```

This step is IMPORTANT because these paths are referenced by the MCServiceGuard cluster scripts, samba.cntl and samba.mon.

2. Create a file */etc/opt/samba/smb.conf.<netbios name>* (For example, */etc/opt/samba/smb.conf.hp_server1*) with the following lines:

```
[global]
  workgroup = ha_domain
  netbios name = ha_server1
  interfaces = XXX.XXX.XXX.XXX/xxx.xxx.xxx.xxx
  bind interfaces only = yes
  log file = /var/opt/samba/ha_server1/logs/log.%m
  lock directory = /var/opt/samba/ha_server1/locks
```

Replace the "XXX.XXX.XXX.XXX/xxx.xxx.xxx.xxx" with one (space separated) relocatable IP address and subnet mask for the MC ServiceGuard package.

If */opt/samba/bin/samba_setup* was run during installation as suggested:

- Take the workgroup line from the */etc/opt/samba/smb.conf* file. Add in the rest of your desired configuration items.
- Take the NetBIOS name line from the same file, or, if there is no NetBIOS name line, put in the UNIX host name for the server on the NetBIOS name line.
- Consider load balancing when creating the share paths.
- Consider whether you need to locate your private files on a shared volume, etc. You may want to review “Special Notes for HA CIFS/9000 Server” found at the end of this section, now.

  Make sure that the file name is in all lowercase letters (e.g. */etc/opt/samba/smb.conf.ha_server1*, NOT */etc/opt/samba/smb.conf.HA_Server1*) even if the NetBIOS name of the server has capital letters. If capital letters are used in the file name, failover will not work properly.

3. Move all relevant data to the CIFS/9000 Server package shared volume.

Relevant data, consisting of all directories and files which will be accessed using CIFS/9000 Server, should reside on shared volumes. This data includes any shares created by the user. For example, if the CIFS/9000 Server administrator creates a `TEST=c:/tmp/test` share, then all the data from */tmp/test* should reside on a shared logical volume.

Below is an example of copied data from the required CIFS/9000 Server directories to the logical volumes in the volume group *vgsamba*. The same can be done for *vgasambapkg2*.

```
mkdir /tmp/share1_copy /tmp/share2_copy
mount /dev/vgsamba/lvol1 /tmp/share1_copy
mount /dev/vgsamba/lvol2 /tmp/share2_copy
cp -r /opt/share1/* /tmp/share1_copy
cp -r /homes/share2/* /tmp/share2_copy
umount  /tmp/share1_copy
umount  /tmp/share2_copy
rm -rf /tmp/share1_copy /tmp/share2_copy
```

4. Create a directory for CIFS/9000 Server cluster package:

   ```
   mkdir /etc/cmcluster/samba
   mkdir /etc/cmcluster/samba/sambapkg1
   ```

5. Copy the sample scripts *samba.conf*, *samba.cntl* and *samba.mon* from */opt/samba/HA/active_active* to */etc/cmcluster/sambapkg1* (or */etc/cmcluster/sambapkg2*) on the primary node. Make all scripts writeable.

   ```
   cp /opt/samba/HA/active_active/samba.* /etc/cmcluster/sambapkg1
   chmod 666 samba.conf samba.cntl samba.mon
   ```

6. Customize the sample scripts for your MC/ServiceGuard configuration. A sample customization of the HA CIFS/9000 Server package configuration, control and monitor scripts are shown below.

7. Ensure that the control (*samba.cntl*) and monitor (*samba.mon*) scripts are executable.

   ```
   chmod 750 samba.cntl samba.mon
   ```

Edit the package configuration file samba.conf

To configure the samba.conf configuration file, complete the following tasks below:

1. Set the PACKAGE_NAME variable.

   ```
   PACKAGE_NAME cifs_pkg1
   ```

   or

   ```
   PACKAGE_NAME cifs_pkg2
   ```

   ...depending on which package you are currently working on.

2. Create a NODE_NAME variable for each node that will run the package. The first NODE_NAME should specify the primary node. All other NODE_NAME variables should specify the alternate nodes in the order in which they will be tried.

   ```
   NODE_NAME  ha_server1
   NODE_NAME  ha_server2
   ```

   ...for Sambapkg1,

   ```
   NODE_NAME  ha_server2
   NODE_NAME  ha_server1
   ```

   ...for Sambapkg2, etc.

3. Set the RUN_SCRIPT and HALT_SCRIPT variables to the full path name of the control script.

   ```
   RUN_SCRIPT /etc/cmcluster/sambapkg1/samba.cntl
   RUN_SCRIPT_TIMEOUT  NO_TIMEOUT
   HALT_SCRIPT  /etc/cmcluster/sambapkg1/samba.cntl
   HALT_SCRIPT_TIMEOUT NO_TIMEOUT
   ```

   ...for sambapkg1, and

   ```
   RUN_SCRIPT /etc/cmcluster/sambapkg2/samba.cntl
   RUN_SCRIPT_TIMEOUT  NO_TIMEOUT
   HALT_SCRIPT  /etc/cmcluster/sambapkg2/samba.cntl
   HALT_SCRIPT_TIMEOUT NO_TIMEOUT
   ```

   ...for sambapkg2, etc.

4. Set the SERVICE_NAME variable to samba_mon

   ```
   SERVICE_NAME  samba_mon1
   SERVICE_FAIL_FAST_ENABLED  NO
   SERVICE_HALT_TIMEOUT     300
   ```

   ...for Sambapkg1, and

```
SERVICE_NAME   samba_mon2
SERVICE_FAIL_FAST_ENABLED  NO
SERVICE_HALT_TIMEOUT       300
```

...for Sambapkg2, etc.

5. Set the SUBNET variable to the subnet that will be monitored for the package, as in the following example:

   ```
   SUBNET 15.13.2.0
   ```

6. The following initialization will cause package failover to occur if there is a node or network failure, even if the CIFS/9000 Server monitor script is not being used.

   ```
   PKG_SWITCHING_ENABLED    YES
   NET_SWITCHING_ENABLED    YES
   ```

7. If NODE_FAIL_FAST_ENABLE is set to NO, the node is not brought down when the package goes down.

   ```
   NODE_FAIL_FAST_ENABLED       NO
   ```

Edit the *samba.cntl* Control Script

To configure the samba.cntl Control Script file, you must complete the following tasks:

1. Set the NETBIOS_NAME variable to your NetBIOS name.

   ```
   NETBIOS_NAME=ha_server1
   ```

   ...for sambapkg1 and

   ```
   NETBIOS_NAME=ha_server2
   ```

   ...for sambapkg2, etc.

2. Create a volume group for the CIFS/9000 Server directories:

   ```
   VG[0]=/dev/vgsambapkg1
   ```

   ...for sambapkg1, and

   ```
   VG[0]=/dev/vgsambapkg2
   ```

   ...for sambapkg2, etc.

3. Create a separate LV[n] and FS[n] variable for each volume group and file system that will be mounted on the server, for example:

```
LV[0]=/dev/vgsambapkg1/lvol1;FS[0]=/opt/share1
LV[1]=/dev/vgsambapkg1/lvol2;FS[1]=/home/share2
```

Add more LVs if required for sambapkg.

```
LV[0]=/dev/vgsambapkg2/lvol1;FS[0]=/opt/share1
LV[1]=/dev/vgsambapkg2/lvol2;FS[1]=/home/share2
```

Add more LVs if required for sambapkg2.

4. Specify the relocatable IP address and the address of the subnet to which the IP address belongs:

```
IP[0]=15.13.171.20
SUBNET[0]=15.13.168.0
```

for sambapkg1,

```
IP[0]=15.13.171.21
SUBNET[0]=15.13.168.0
```

...for sambapkg2, etc.

5. If you want to use the CIFS/9000 Server monitor script, set the NFS_SERVICE_NAME variable to the value of the SERVICE_NAME variable in the package configuration file samba.conf.

```
SERVICE_NAME[0]=samba_mon1
SERVICE_CMD[0]=/etc/cmcluster/sambapkg1/samba.mon
```

6. Use the following as a template for *customer_defined_run_cmds*.

```
NETBIOS_NAME=ha_server1

CONF_FILE=/etc/opt/samba/smb.conf.${NETBIOS_NAME}
LOG_FILE=/var/opt/samba/${NETBIOS_NAME}/log
SMBD_PID_FILE=/var/opt/samba/${NETBIOS_NAME}/locks/smbd.
pid
NMBD_PID_FILE=/var/opt/samba/${NETBIOS_NAME}/locks/nmbd.
pid

findproc() {            # return pid of the named
process(es)
     pid=`/usr/bin/ps -e |
         /usr/bin/grep "$1" | grep "mbd" |
        /usr/bin/sed -e 's/^  *//' -e 's/ .*//'`
}

function customer_defined_run_cmds
```

```
{
# ADD customer defined run commands.

  nmbd -D -l ${LOG_FILE} -s ${CONF_FILE}
  smbd -D -s ${CONF_FILE}

  test_return 51
}
```

7. Use the following as a template for *customer_defined_halt_cmds*:

```
function customer_defined_halt_cmds
{
#ADD customer defined halt commands.

  if [ ! -f ${SMBD_PID_FILE} ]
  then
    print "\tERROR: Kill of smbd.pid failed."
    print "\tERROR: ${SMBD_PID_FILE} could not be found."
  else
    SMBD_PID=`cat ${SMBD_PID_FILE}`
    findproc $SMBD_PID
    if [ "$pid" = "" ]
    then
      print "\tERROR: Kill of smbd.pid failed."
      print "\tERROR: ${SMBD_PID} could not be found."
    else
      kill ${SMBD_PID}
    fi
  fi

  if [ ! -f ${NMBD_PID_FILE} ]
  then
    print "\tERROR: Kill of nmbd.pid failed."
    print "\tERROR: ${NMBD_PID_FILE} could not be found."
  else
    NMBD_PID=`cat ${NMBD_PID_FILE}`
    findproc $NMBD_PID
    if [ "$pid" = "" ]
    then
      print "\tERROR: Kill of nmbd.pid failed."
      print "\tERROR: ${NMBD_PID} could not be found."
  else
```

```
        kill ${NMBD_PID}
      fi
    fi

    test_return 52
  }
```

WARNING

Make sure that all processes/applications that access the file systems mounted by sambapkg are shutdown in the customer_defined_halt_cmds subroutine. This will allow the filesystems to be unmounted and failed over to the adoptive node. Package failover may not occur if any of the filesystems mounted by the sambapkg cannot be unmounted.

Edit the samba.mon Monitor Script

To configure the *samba.mon* Monitor Script file, you must complete the following tasks:

1. Set the NETBIOS_NAME variable to your NetBIOS name.

   ```
   NETBIOS_NAME=ha_server1
   ```

   ...and sambapkg1,

   ```
   NETBIOS_NAME=ha_server2
   ```

   ...for sambapkg2, etc.

2. Use the following template provided with *samba.mon*.

   ```
   CONF_FILE=/etc/opt/samba/smb.conf.${NETBIOS_NAME}
   LOG_FILE=/var/opt/samba/${NETBIOS_NAME}/log
   SMBD_PID_FILE=/var/opt/samba/${NETBIOS_NAME}/locks/smbd.pid
   NMBD_PID_FILE=/var/opt/samba/${NETBIOS_NAME}/locks/nmbd.pid

   INTERVAL=30

   MAX_NMBD_RETRYS=1
   MAX_SMBD_RETRYS=1

   PATH=$PATH:/opt/samba/bin
   ```

```
error_msg()
{
print "$(date '+%b %e %X') - $1"
}

#
# Function findproc
#
findproc() {      # return pid of the named process(es)
         pid=`/usr/bin/ps -e |
         /usr/bin/grep "$1" | grep "mbd" |
         /usr/bin/sed -e 's/^  *//' -e 's/ .*//'`
}


#
# Function startnmbd
#

startnmbd() {          # start the nmbd
        logger -t "${NETBIOS_NAME}.mon" "${NETBIOS_NAME} nmbd
daemon is not running.  Restarting daemon."
        nmbd -D -l ${LOG_FILE} -s ${CONF_FILE}
}

startsmbd() {          # start the nmbd
        logger -t "${NETBIOS_NAME}.mon" "${NETBIOS_NAME}
smbd daemon is not running.  Restarting daemon."
        smbd -D -s ${CONF_FILE}
}

while :
do

    if [ ! -f ${NMBD_PID_FILE} ]
    then
      sleep 1
      print "\tERROR: ${NMBD_PID_FILE} could not be found!"
      exit 1
   else
      NMBD_PID=`cat ${NMBD_PID_FILE}`
      findproc $NMBD_PID
      if [ "$pid" = "" ] ; then
        if  [ "$MAX_NMBD_RETRYS" -gt 0 ] ; then
            startnmbd
```

```
            if  [ "$MAX_NMBD_RETRYS" -ge 1 ] ; then
                (( MAX_NMBD_RETRYS = MAX_NMBD_RETRYS - 1 ))
            fi
          else
            sleep 1
            echo "ERROR: ${NETBIOS_NAME} nmbd not running!"
            exit 1
          fi
        fi
      fi

      if [ ! -f ${SMBD_PID_FILE} ]
      then
        sleep 1
        print "\tERROR: ${SMBD_PID_FILE} could not be found!"
        exit 1
      else
        SMBD_PID=`cat ${SMBD_PID_FILE}`
        findproc $SMBD_PID
        if [ "$pid" = "" ] ; then
          if  [ "$MAX_SMBD_RETRYS" -gt 0 ] ; then
            startsmbd
            if  [ "$MAX_SMBD_RETRYS" -ge 1 ] ; then
                (( MAX_SMBD_RETRYS = MAX_SMBD_RETRYS - 1 ))
            fi
          else
            sleep 1
            echo "ERROR: ${NETBIOS_NAME} smbd not running!"
            exit 1
          fi
        fi
      fi

    sleep $INTERVAL
  done
```

Create the MC/ServiceGuard Binary Configuration File

NOTE In the following example, the cluster configuration file will be assigned the name */etc/cmcluster/cluster.conf* and the HA CIFS/9000 Server package configuration file will be assigned the name

/etc/cmcluster/samba/sambapkg1/samba.conf. The actual cluster and HA CIFS/9000 Server package configuration file names on your system may be different.

1. On alternate nodes create a cluster package directory:

   ```
   mkdir /etc/cmcluster/samba/sambapkg1 or sambapkg2, sambapkg3..n
   ```

   Copy the package scripts from the primary node.

   ```
   rcp primary_node:/etc/cmcluster/samba/sambapkg1/* \
   /etc/cmcluster/samba/sambapkg1
   ```

2. Use the cmcheckconf command to verify the contents of your cluster and package configuration. At this point it is assumed that you have created your MCServiceGuard cluster configuration file (cmclconf.ascii) through MCServiceGuard procedures.

   ```
   cmcheckconf -C /etc/cmcluster/cmclconf.ascii \
               -P /etc/cmcluster/samba/sambapkg1/samba.conf \
               -P /etc/cmcluster/samba/sambapkg2/samba.conf
   ```

3. Use the cmapplyconf command to copy the binary configuration file to all the nodes in the cluster.

   ```
   cmapplyconf -v -C /etc/cmcluster/cmclconf.ascii \
               -P /etc/cmcluster/samba/sambapkg1/samba.conf \
               -P /etc/cmcluster/samba/sambapkg2/samba.conf
   ```

   This command will distribute the updated cluster binary configuration file to all of the nodes of the cluster.

   You are ready to start the HA CIFS/9000 Server packages.

   The configuration of the HA CIFS/9000 Server is now complete.

Special Notes for HA CIFS/9000 Server

There are several areas of concern when implementing Samba in the MC/ServiceGuard HA framework. These areas are described below:

- Client Applications

  HA CIFS/9000 Server cannot guarantee that client applications with open files on a CIFS/9000 Server share, or, applications launched from CIFS/9000 Server shares, will transparently recover from a switchover. In these instances there may be cases where the application will need to be restarted and the files reopened as a switchover is a logical shutdown and restart of the CIFS/9000 Server.

- File Locks

  File locks are not preserved during failover. File locks are lost and applications are not advised about any lost file locks.

- Print Jobs

  If a failover occurs when a print job is in process, the job may be printed twice or not at all, depending on the job state at the time of the failover.

- Symbolic Links

  If you have your Samba server configured with *follow symlinks* set to *yes* and *wide links* set to *yes*, the defaults for these parameters, you should be cautious.

  Symbolic links in the shared directory trees may point to files outside any shared directory. If the symbolic links point to files that are not in logical shared volumes, then, after a failover occurs, the symbolic link may point to a different file or no file. Keeping the targets of all shared symbolic links synchronized with all MC/ServiceGuard nodes at all times could be difficult in this situation.

  Easier options would be to set *wide links* to *no* or to be sure that every file or directory that you point to is on a logical shared volume.

- Security Files and Encrypted Passwords

  Authentication is dependent on several entries in different security files. An important security file is the user password file, *smbpasswd*. If you have your Samba server configured with encrypt passwords

set to yes, then you have to use an *smbpasswd* file. By default, this file is located in the path */var/opt/samba/private* but you may specify a different path with the smb passwd file parameter.

Another important security file used with domain level security is the machine account file, <*domain.server*>.*mac*. Since this file will be updated periodically (as defined in *smb.conf* by machine password timeout, 604800 seconds by default), HP recommends that you locate <*domain.server*>.*mac* on a shared logical volume. As with the *smbpasswd file*, discussed above, the location of this file is defined by the *smb.conf* parameter smb passwd file. For example, smb passwd file = /var/opt/samba/shared_vol_1/private/smbpasswd will result in the file */var/opt/samba/shared_vol_1/private/*<*domain.server*>.*mac*.

For both the machine account file and user password file, HP recommends that you locate the files on a shared logical volume. Do so by setting smb passwd file to a path within a logical shared volume.

- Username Mapping File

  If you configure your Samba server to use a username mapping file, HP recommends that you configure it to be located on a shared logical volume. This way, if changes are made, all the nodes will always be up-to-date. The username mapping file location is defined in *smb.conf* by the parameter username map, e.g. username map = /var/opt/samba/shared_vol_1/username.map. There is no username map file by default.

- Samba as a WINS Server

  If you configure your Samba server to be a WINS server by setting the wins support parameter to yes, it will store the WINS database in the file */var/opt/samba/locks/WINS.DAT*.

  If this file is not on a logical shared volume, when a failover occurs, there will be a short period of time when all the WINS clients update the Samba WINS server with their address. However, if this short period of time to restore the WINS database is not acceptable, you can reduce the period of time to restore the full WINS service.

To do so, configure */var/opt/samba/locks/WINS.DAT* to be a symbolic link to a WINS.DAT file on a logical shared volume. HP does not recommend putting the entire */var/opt/samba/locks* directory on a logical shared volume, because the locking data may not be correctly interpreted after a failover.

- Samba as a Master Browser

  If you configure your Samba server to be the domain master browser by setting the *domain master* to yes, it will store the browsing database in the */var/opt/samba/locks/BROWSE.DAT* file. HP does not recommend doing this in an HA configuration.

  If you do so, you will probably want to configure */var/opt/samba/locks/BROWSE.DAT* as a symbolic link to a *BROWSE.DAT* file on a logical shared volume. HP doesn't recommend putting the entire */var/opt/samba/locks* directory on a logical shared volume because the locking data may not be correctly interpreted after a failover.

- Automatic Printer Sharing

  If you configure your Samba server with a `[printers]` share to automatically share all the printers on your HP-UX system, then you will need to be certain that all your MC/ServiceGuard nodes have the same HP-UX printers defined. Otherwise, when a failover occurs, the list of shared printers for the Samba server will change, resulting in problems on clients using those printers.

- Samba's *LMHOSTS File*

  If you wish to use an *LMHOSTS* file to store the static addresses for certain *netbios* names, HP recommends that you put the *LMHOSTS* file on a logical shared volume. To do this you will need to specify a different path for the *LMHOSTS file* using the `-H` option when invoking *nmbd*. HP recommends that you put the *LMHOSTS* file on a logical shared volume so that all the nodes can share it.

  You will need to edit the MC/ServiceGuard scripts to add the `-H` options to the places where *nmbd* is invoked directly. You will also need to edit the */opt/samba/bin/startsmb* script to add the `-H` option to the places where *nmbd* is started.

7 HP-UX Configuration for CIFS/9000

This chapter describes HP-UX tuning procedures for the HP CIFS/9000 Server. It contains the following sections:

- CIFS/9000 Server Memory and Disc Requirements
- CIFS/9000 Process Model
- Overview of Kernel Configuration Parameters
- Configuring Kernel Parameters for CIFS/9000

The following information should be considered as general guidelines and not a rigid formula to determine the resource requirements of a CIFS/9000 server running on HP-UX 11.0. Each customer configuration is unique and on-line tools should be used while the system is running its normal load to ascertain the requirements of each system.

NOTE Guidelines have changed in version A.01.08. Specifically, the use of *nfiles* has increased from a minimum of 8, to 23, and *nflocks* has been added as a mandatory configurable parameter.

CIFS/9000 Process Model

The SMB daemon process, *smbd*, handles all SMB requests from a client. One such process is launched for each connected client. Each SMBD process handles one and only one client. Therefore, if there are 2048 connected clients, there will be 2048 SMBD processes. Such a large number of processes will demand system resources, requiring adjustment of certain kernel configuration parameters. It will also deplete memory, disc and swap space resources.

Overview of Kernel Configuration Parameters

The kernel configuration parameters, *maxuser*, *nproc*, *ninode*, *nflocks* and *nfile* are described below. These are the kernel parameters that you must adjust to support a large number of clients on CIFS/9000.

- *maxusers*: the name of this kernel parameter is a misnomer as it does not directly control the number of UNIX users that can logon to HP-UX. However, this kernel parameter is used in various formulae throughout the kernel. In fact, the default values for *nproc*, *nfiles* and *ninodes* are expressed in terms of *maxusers*.
- *nproc*: this kernel parameter controls the size of the process table. Its default formula is (*20+8*maxusers*). On most systems the default value for this parameter is 21, which yields a default value of 20+8*32 or 276 maximum processes supported. When this table fills up prior to launching a process, the error message: “proc: table is full” will appear on the console. It will be viewable via the *dmesg* command.
- *nfile*: this kernel parameter controls the size of the system file table and limits the total number of open files in the system. Note that this affects each instance of an open file since the same file opened twice would take up 2 entries in the system file table. This default formula is (16*(nproc+16+maxusers)/10+32+2*(npty+nstrpty+nstrtel)). When this tables becomes full, the console message file: table is full will appear on the console.
- *ninode*: this kernel parameters controls the size of the in-core inode table or the inode cache. To improve performance, the most recently accessed inodes are kept in memory. The default formula for this parameter is ((nproc+16+maxusers)+32+(2*npty)). Attempts to open a file beyond the capacity of this table will result in the message inode table full being displayed on the console.
- *nflocks:* defines the maximum combined total number of file locks that are available system-wide to all processes at any given time. The default value of 200 will need to be increased for CIFS/9000 Servers.

Configuring Kernel Parameters for CIFS/9000

The first step in configuring HPUX to be able to support a large number of clients on a CIFS/9000 server is to adjust the *maxusers* kernel parameter.

The second step involves adjusting *nproc*, *nfile*, *nflocks* and *ninode* individually so as to allow a large number of users to be connected simultaneously.

1. Configuring *maxusers*

   Determine the maximum number of simultaneous clients that will be connected and add this number to the current value of *maxusers*. For example, if 2048 clients are to be supported, simply add 2048 to the current value of *maxusers*. Note that, unless the parameters have been manually changed, adjusting *maxusers* automatically adjusts the corresponding values for *nproc*, *nfile* and *ninodes*.

   For example, if the default *maxusers* value of 32 is adjusted to 32+2048 or 2080 to support the maximum allowable clients of 2048, the other parameters will be adjusted as follows on a typical system:

   nproc will be increased to 8,468

   nfile will be increased to 15,656

   ninode will be increased to 9,692

   If these values are found to be too large or too small for that matter, then the individual kernel parameters can be adjusted as described below.

2. Configuring *nproc*, *nfile* and *ninode*.

   - *nproc:* since each client will be handled by one unique *smbd* process, and each process will take up one entry in the process table, this parameter has to be at least equal to the maximum number of simultaneously connected clients. This is a necessary condition, but it will obviously not be sufficient since there will be others processes, including system processes beyond your control, that will take up *proc* table entries. In practice then, this parameter needs to be set to the anticipated maximum number of clients plus the number of the other processes that will also be running concurrent with CIFS/9000.

- *nfile:* when an SMBD process is launched, it will, right at the beginning, take up 23 entries in the system file table.

  This does not include any other files that the client will open and operate on. At a minimum, therefore, the value of *nfile*, should be equal to the anticipated number of simultaneous clients times (23 + the anticipated number of files simultaneously opened by each client). Again, this is necessary, but it may not be sufficient, since there will be other non-CIFS/9000 processes that will have files opened, concurrent with CIFS/9000.

- *ninode*: unlike *nfile*, each instance on an open will NOT increase the number of inode entries. Rather, each unique opened file will only take up one entry, regardless of how many times it is opened. Therefore this parameter should be set to the anticipated number of UNIQUE open files used by CIFS/9000 plus the number opened by other processes in the system.

- *nflocks:* each smbd process will utilize at least ten file locks. Therefore, the value of *nflocks* should, at least, be equal to the anticipated number of simultaneous clients, multiplied by ten (10). The use of *nflocks* by other applications must also be considered.

Swap Space Requirements

Due to the one-process-per-client model of CIFS/9000, perhaps the most stringent requirement imposed on the system is that of swap space. HPUX reserves a certain amount of swap space for each process that is launched, to prevent it from being aborted in case it needs to swap out some pages during times of memory pressure. Other operating systems, only reserve swap space when it is needed. This results in the process not finding the swap space that it needs, in which case it has to be terminated by the OS.

Each *smbd* process will reserve about 1.7MB of swap space. For a maximum of 2048 clients, 1.7 * 2048 or about 4GB of swap space would be required. Therefore, HP recommends configuring enough swap space to accommodate the maximum number of simultaneous clients connected to the CIFS/9000 server.

Memory Requirements

Each *smbd* process will need approximate 1/2 MB of memory. For 2048 clients, therefore, the system should have at least 1 GB of physical memory. This is over and above the requirements of other applications that will be running concurrent with CIFS/9000.

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Glossary

A

ACL Access Control List, meta-data that describes which users are allowed access to file data and what type of access is granted to that data. ACLs define “access rights.” In this scheme, users typically belong to “groups,” and groups are given access rights as a whole. Typical types of access rights are read (list), write (modify), or create (insert.) Different file systems have varying levels of ACL support and different file systems define different access rights. For example, DOS has only one set of rights for a file (since only one user is considered to use a DOS system). A POSIX 6-compliant file system allows multiple rights to be assigned to multiple files and directories for multiple users and multiple groups of users.

ASP Application service provider, an e-business that essentially “rents” applications to users.

Authentication Scheme to ensure that a user who is accessing file data is indeed the intended user. A secure networked file system uses authentication to prevent access occurring from someone pretending to be the intended user.

Authorization Ensures that a user has access only to file system data that the user has the right to access. Just because a user is authenticated does not mean he or she should be able to read or modify any file. In the simplest form or authorization, users are given read or modify permissions to individual files and directories in a file system, through the use of access control information (called an Access Control List, or ACL.)

C

CIFS Common Internet File System, a specification for a file access protocol designed for the Internet.

CIFS/9000 Hewlett-Packard's implementation of CIFS for UNIX. CIFS/9000 provides both server and client modules for both HP 9000 servers and workstations.

Credential A piece of information that identifies a user. A credential may be as simple as a number that is uniquely associated with a user (like a social security number), or it may be complicated and contain additional identifying information. A strong credential contains proof, sometimes called a verifier, that the user of the credential is indeed the actual user the credential identifies.

D

Diffie-Hellman A protocol used to securely share a secret key between two users. Diffie-Hellman protocol uses a form of public key exchange to share the secret key. Diffie-Hellman is known to be susceptible to an interceptor's attack, but authenticated Diffie-Hellman Key Agreement, a later enhancement, prevents such a middle-person attack.

E

Encryption Encryption ensures that data is viewable only by those who possess a secret (or private) key. Encrypted data is meaningless unless the secret key is used to decrypt the data. Encryption and decryption of data is called ciphering.

I

Integrity Integrity ensures that file system data is not modified by an intruder. An intruder can not intercept a file system data packet and modify it without the network file system discovering and rejecting the tampering.

K

Kerberos An authentication and authorization security system developed by MIT and the IETF working group. It is based on secret key technology, and is generally easier to manage than a public key infrastructure because of its centralized design. However, Kerberos is not as scalable as a public key infrastructure.

P

Public Key An encryption method by which two users exchange data securely, but in one direction only. A user, who has a private key, creates a corresponding public key. This public key can be given to anyone. Anyone who wishes to send encrypted data to the user may encrypt the data using the public key. Only the user who possesses the private key can decrypt the data.

Public Key Infrastructure Method of managing public key encryption. Although public key technology has the advantage of never exchanging decryption keys, it has the disadvantage of being difficult to manage. Some issues include distribution of public keys with proof of the key's ownership, and revocation of expired or terminated keys.

S

Samba An open source product that first appeared in the mid-1990's. Samba provides NT file and print server capability for UNIX systems, including most of the capabilities of Advanced Server for UNIX, with the exception of the Primary Domain Controller (PDC) and Backup Domain Controller (BDC) synchronization protocols. Although Samba is widely used, vendor support for it is not generally available.

Secret Key Secret key, also known as symmetric-key or shared-key, encryption is a ciphering technique by which two users exchange data by encrypting and decrypting data with a shared secret key. Data is both encrypted and decrypted with the same key. The secret key must be exchanged securely (such as through the “cones of silence”) since anyone knowing the secret key can decrypt the data.

SMB Server Message Block, the file-sharing protocol at the heart of Windows networking. SMB is shared by Windows NT, Windows 95, Windows for Workgroups, and OS/2 LAN Manager. CIFS is essentially a renaming of this protocol.

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